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ABSTRACT

This book is intended to assist teachers, practitioners, and administrators to develop programs for training nonphysician, primary health care workers in Third World countries. It contains the instructional context of a comprehensive training program, organized into chapters and presented in outline form. Learning strategies follow each section of instructional content. These build on the technical knowledge contained in each discussion, as well as the students' own perceptions and experiences, and relate all these elements to their future roles as primary health care workers. The book is organized in three parts. Part 1 contains a discussion of the social process skills needed by the primary health care worker. It considers the necessary skills and qualities, how they may be acquired, and how they become translated into action. Parts 2 and 3 contain instructional content and associated learning strategies. They address first the health of the community, and then discuss the health of the individual. Topics covered include health education, nutrition, population control, health services, prevention and control of disease, health data, providing care for mothers, children, and adults, and health-related sciences. Appended is a bibliography of relevant materials, with annotations and details of how to obtain them. (KC)

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TEACHING STRATEGIES FOR PRIMARY HEALTH CARE

A Syllabus

By Ines Durana

With Huberte Gautreau, Stephanie Simmonds,
Jeannine Desclaux, and Veronica Elliott

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PREFACE

The Rockefeller Foundation, since its incorporation in 1913, has contributed to many aspects of biomedical science and public health. One such is health care for the community, which designates the activities intended to improve the healthfulness of specific, local communities — a concept pioneered by John B. Grant, a Foundation staff member who worked for almost four decades in China, India, and Puerto Rico. Carrying on the traditional interest in this field, Ines Durana presents in this manual a method for implementing primary community health care.

Dr. Durana's book is based on her experience while a member of the field staff of the Foundation's Education for Development program. Initiated in 1963 as a cooperative effort with local institutions in a number of countries in Latin America, Africa, and Asia, the program has given high priority to assisting those institutions to strengthen teaching and research facilities, develop effective indigenous leadership, and better respond to national and regional needs.

While on assignment in Zaïre in the late 1970's, Dr. Durana, working with Zaïrois colleagues and individuals from many national and international organizations, developed a new curriculum and training program for middle-level paramedical personnel — the primary health care workers who constitute a critically important segment of health personnel not only in Zaïre but throughout the world.

Her book is a practical syllabus — an organization of technical knowledge and teaching strategies geared to make such knowledge of practical use. It is a significant

international contribution to all areas where primary care has, or should have, an important role to play in the health of communities.

Kenneth S. Warren
Director, Health Sciences
The Rockefeller Foundation

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The authors wish to express their gratitude to the government of Zaïre, which invited us to develop a project to improve paramedical education in an effort to redirect health policy through training. Our manual is the result of the planning and implementation of this project, which took place between 1975 and 1978. Particularly helpful were former ministers of health Dr. Nguete Kikhela and Dr. Nsita Makansi; Mr. Lukaso Djate Lokoto of the Manpower Development section of the Ministry of Health; and Dr. Muyembe, Dr. Mbendi, Dr. Kaba, and Dr. Kasadi of the Health Sciences Department of the National University of Zaïre.

The original study and subsequent government publication were undertaken with the cooperation of the following organizations: OXFAM, the World Health Organization, the Peace Corps, FOMECO, the Agency for International Development, the Mama Yemo Hospital, the Kinoise Clinic, and various religious missions in Zaïre, especially Yasa Bonga, Kimpese, Kisantu, and Vanga. We specifically want to mention the assistance provided by Dr. Tim Lusty, Dr. Darrel N. Newkirk, and Dr. Joe D. Wray as medical advisers, and by Mark Robbins, Christine Biltresse, Dr. William T. Close, Aena Konde, Pakha Nimy, and Paulette Chaponnière for their ideas and support.

Our acknowledgments are also extended to Joseph E. Black and Ralph K. Davidson of The Rockefeller Foundation, to former Rockefeller Foundation staff members Willoughby Lathem, Guy Hayes, Edith E. King, and Thelma Ingles, and to Makiesse Mvemba, for their support in the development of the project; and to

James S. Coleman, Lucy M. Cohen, Ines Ortega de Kinnane, and Joseph F. Luetkemeyer for their perceptive comments on the manuscript and their continued interest in the program. Finally, our appreciation goes to the staff of the National Library of Medicine in Washington, D.C. for its assistance in supplying reference materials and other information; to Muriel Regan, Sarah Jane Kryszak, Elizabeth Power, Winfield Swanson, and Elizabeth Ness, who made valuable suggestions concerning the organization of the material; to Bonnie Loper and Louisa Devos, who typed the manuscript; and to Henry Romney, Beth Greenfeld, and Richard Dodson, who prepared this book for publication by The Rockefeller Foundation.

Major contributions to particular sections of the book were made by the following: Part I—Louise M. Berman, President, World Council for Curriculum and Instruction; Professor and Associate Dean, College of Education, University of Maryland. Part II—Stephanie Simmonds, Community Health Adviser, OXFAM; Jeannine Desclaux, Nurse Consultant and Head of Nursing Programs, WHO; and Joseph C. Fahs, Peace Corps Volunteer in Zaïre; with the assistance of C. Badouraux, N. Danforth, P. Foster, D. Fountain, J. E. Horley, R. Johnson, K. Kamba, M. Kinzonzi, J. L. Lamboray, B. McCullough, I. Nieboer, L. Tshitshiku, D. Vaiery, W. Van Pelt, and E. Wachter. Part III—Huberte Gautreau, Nurse Consultant, WHO; Jeannine Desclaux, Nurse Consultant and Head of Nursing Programs, WHO; with the assistance of R. M. Bonne, H. Cordier, P. De Vos, E. Frevert, Y. Likongo, D. L. Lukaso, C. Luvweso, G. Van Geert, A. M. Verwilghen, and A. Voth.

Ines Durana

INTRODUCTION

This book will assist teachers, practitioners, and administrators in developing programs for training nonphysician, primary health care workers in the Third World. It contains the instructional context of a comprehensive training program, organized into chapters and presented in outline form. Learning strategies follow each section of instructional content. These build on the technical knowledge contained in each discussion, as well as the students' own perceptions and experiences, and relate all these elements to their future roles as primary health care workers. The book should guide its user in combining theory and practice into a dynamic and relevant training program.

The Challenge of Primary Health Care

Primary health care has been defined as:

> simple and effective measures, in terms of cost, technique, and organization, which are easily accessible to the people requiring relief from pain and suffering and which improve the living conditions of individuals, families, and communities. These measures are aimed at providing answers to the fundamental human health needs, which are expressed as: (a) Where can I go and what can I do for the relief of pain and suffering? (b) What can I do to live a healthy life? These measures include preventive, promotive, curative, rehabilitative, and community development activities.
>
> *Dr. H. Mahler*
> *28th World Health Assembly, 1975*

In the Third World, the need to bring health care within the reach of all people has led to the recognition of the importance of nonphysician primary health care workers. It is difficult to develop an all-encompassing description

of the primary health care worker in the Third World because variations exist in different countries or have been advocated by different organizations. However, there are certain general features which characterize the primary health care worker and which underlie the training program presented in this volume.

The primary health care worker is an intermediate-level practitioner responsible for the backup system of primary health care and the member of the health care team closest to the community. He or she refers people with serious or unusual health problems to more specialized practitioners found at a regional center or hospital, thus acting as a bridge between the community and these organized health services. The primary health care worker is usually based at a health post or dispensary. If there are no resources of this sort, primary health care workers schedule days in one community or another on a routine basis or as they are needed. In either case, the primary care worker may assist in the supervision and coordination of health and health-related activities of the village health workers who have received only brief training.

Primary care workers must be carefully selected and suitably trained. It is assumed in this volume that those selected for training as primary health care workers have completed primary education and have had some secondary level schooling.

In reviewing candidates for their suitability for training, personal attributes should be considered in addition to academic ability. The technical knowledge acquired during the training process is of little value unless it can be applied. The learning strategies in this volume and the discussion of social process skills in the following chapter provide guidance to help students apply what they learn, but a desire to help the community fulfill their health care needs is an essential characteristic of the primary care worker.

In some situations, primary care workers are sponsored

by the community and will have completed their formal education some years before they begin their training. In other situations, they may be selected for training while still at school, based on ability and desire to become a health worker. Or it may be that the training program is offered to those who have already worked in the health area in some other capacity. This broad base of recruitment necessitates a training program which builds on the experiences offered by the students. The learning strategies in this publication are important in achieving this objective.

The training process itself contributes to the success or failure of primary health care. The instructional content in this publication is deliberately flexible. The format outlines topics without any great detail because the instructors themselves should adapt and augment the specific material so that the program reflects the local situation and health priorities. The learning strategies can be used by the instructor to evaluate the following skills:

- Discrimination: Knowing *when* to do it and knowing when it is done
- Problem-solving: How to decide *what* to do
- Recall: Knowing what to do and knowing *why* to do it
- Manipulation: *How* to do it
- Communication: *How* to say it

The physical location of the training program also contributes to the training process. It is important that primary care workers be trained in an environment similar to that in which they will work. Therefore, programs should be situated close to a dispensary or health center rather than a hospital or university, and in an area of rural population which is to be served by primary care workers.

At the completion of the training program outlined in this volume, primary care workers will be equipped and motivated to fulfill their role as an important community

resource. In the area of health promotion and the prevention of disease, they will be able to perform the following:

- Assess the general condition of the health of the population.
- Define the health priorities of the community.
- Participate with local authorities and other health personnel in community development activities.
- Analyze the beliefs and cultural practices related to health and design health approaches that adapt and integrate useful practices.
- Identify health problems among infants, children, and adults.
- Assist the mother during a normal pregnancy and delivery.
- Give postnatal care to the mother and newborn.
- Give health education to the family.
- Give information about fertility control.
- Follow the physical and psychological development of under-5 children and school-aged children and give pertinent health education.
- Perform immunizations, schedule regular vaccination sessions.

In fulfilling their role in the diagnosis and prevention of disease, primary health care workers will:

- Assist and teach the family in the provision of care to ambulatory or bedridden patients.
- Administer and control the effects of medical treatments.
- Identify complicated and high-risk pregnancies and refer to specialized services.
- Identify and manage a treatment plan for diseases by levels of care.
- Refer cases, when appropriate, for more specialized care.

- Perform the most common laboratory examinations.
- Inform the patient and/or family about illness, treatment, and prevention.

Finally, as a planner and administrator, the primary health care worker will be able to:

- Organize the activities which comprise health care services in a dispensary.
- Coordinate the activities of primary health services with specialized programs.
- Take an inventory of the available resources and estimate needs.
- Ensure the supply of material, equipment, and medications.
- Maintain charts, registers, and statistics, interpret findings and make recommendations for action.
- Evaluate the quality of care and take appropriate action to improve delivery of care.
- Establish relations with other personnel and the community.

Background of the Publication

The material presented here is based on the work of many different people in the Republic of Zaïre at a time when considerable efforts were being made by the government to redirect health policy and make health care services available in rural areas. Before seeking to expand the training opportunities for primary health care workers, the work roles of existing workers and the central role of the family and indigenous healers in health care were identified through observation and discussion. Based on these observations, a curriculum was developed in consultation with those working in the field and with other specialists. The training program developed specifically for this purpose in Zaïre has been translated, condensed, and modified to make

it of value to a broader audience and to form the basis of this publication.

The Organization and Use of the Publication

The book is organized into three parts. Part I contains a discussion of the social process skills needed by the primary health care worker. It considers the necessary skills and qualities, how they may be acquired, and how they become translated into action.

Parts II and III contain instructional content and associated learning strategies. They address first the health of the community, and then discuss the health of the individual.

Appended is a bibliography of relevant materials, with annotations and details of how to obtain them.

This document is a tool. It is intended to assist instructors, administrators, or program planners as they develop a training program to suit their own circumstances. The teacher should use the instructional content sections as a checklist to assure that no topics are excluded, and as a model for how the material might be presented in the training center. Some learning strategies will be useful as they are, others may need to be adapted to better reflect the local situation.

There is no attempt to prescribe the amount of time which should be devoted to each part of the instructional content. However, the administrator or planner should use the content as a guide and work with experienced instructors to develop a schedule for the training program.

Finally, in emphasizing the importance of primary care workers and in documenting the social and technical skills which are critical in primary care, the publication may encourage the development of further training opportunities in areas where primary health care workers are urgently needed.

PART I

Social Process Skills and the Primary Health Care Worker

1
SOCIAL PROCESS SKILLS AND THE PRIMARY HEALTH CARE WORKER

The training of primary health care workers must give proper attention to the personal qualities and skills that accompany effective performance of medical tasks. Indeed, all members of the health care team need a repertoire of skills which enables them to provide health care in a culturally acceptable manner. Those skills augment and complement the information and techniques acquired during training in medical care; knowledge of both technical skills and social process skills are essential to primary health care workers. The present chapter discusses how nonphysician personnel in primary care roles in Third World countries acquire these basic human qualities for the adequate implementation of technical skills.[1,2]

First, the social process skills and human qualities essential for primary health care workers are examined. The second part describes how the necessary skills may be acquired or developed, and the third presents a translation of these qualities into the action that is required of primary health care workers.

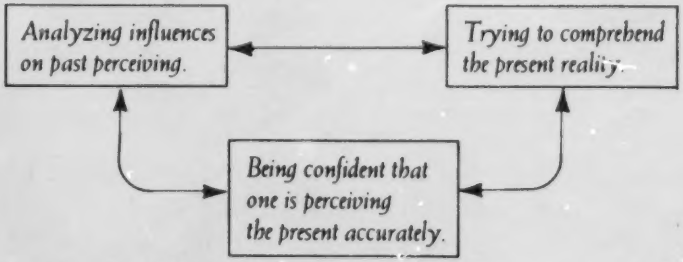
Social Process Skills

Social process skills are those elements of interpersonal dynamics, motive, and responsibility which make people contributing members of the world in which they live. When part of the behavior of the primary health care worker, they complement his or her medical knowledge. These skills are critical in applying medical knowledge when primary health care workers interact with individuals and communities. Such skills and qualities are discussed in the paragraphs below.

1. *The primary health care worker is aware of the influence of perception on action.*

Perception is one of the key concepts in human behavior, a major intervening variable between stimuli and action. Perception provides an ordering mechanism which gives structure and order to a course of action. Perception of past experience influences perception of present experience. Rich and full perception of the present enables better, more substantive decision-making. People have different ways of perceiving, but it must not be assumed that persons in surroundings which appear meager are necessarily less perceptive than those people whose lives are full of environmental stimuli.

Perception involves:


Analyzing influences on past perceiving.
Trying to comprehend the present reality.
Being confident that one is perceiving the present accurately.

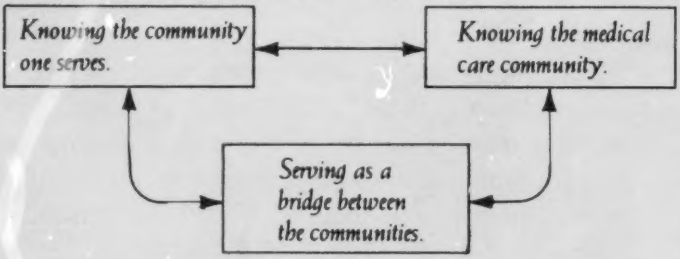
In the health field, awareness of their own modes of perceiving enables health care workers to understand the state of health and disease in the individual and the community and the accompanying social ramifications. Awareness of how they perceive helps health care workers to understand how they really see a patient, not only as a health statistic, but also as a being with concomitant fears, hopes, and desires and as a member of a family and a community.

2. *The primary health care worker functions productively in a variety of social settings.*

Persons working in health-oriented positions are members of two or more communities simultaneously. The primary health care worker is a member of the community

who also serves a community of individuals with health care needs. In order to be an effective member of both social groups and act as a bridge between them, primary health care workers must recognize that they are full members of each community and balance the dual allegiance.

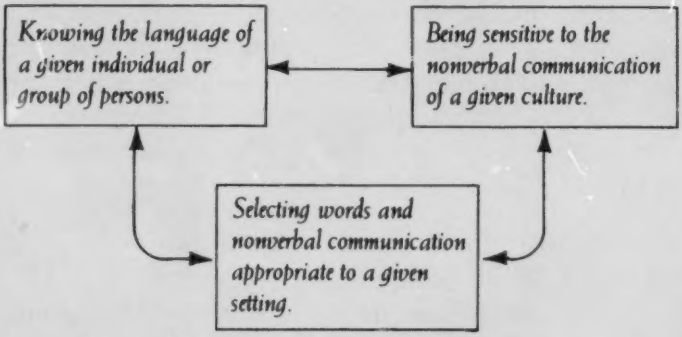
Analyzing social settings involves:



3. *The primary health care worker communicates effectively with a variety of persons.*

Besides being able to live in a variety of communities, the health worker must communicate effectively with the many different types of people who reside in these communities: the poor person, the wealthy person, the physician, the priest, the native healer, the distraught child, or the new mother. The primary health care worker should be able to respond to a message so that the sender of the message knows he was understood clearly. The health care worker must be able to respond with sensitivity to nonverbal as well as verbal messages.

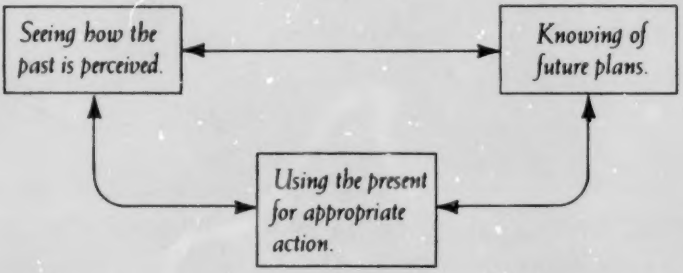
Communicating with a variety of persons involves:


Knowing the language of a given individual or group of persons.
Being sensitive to the nonverbal communication of a given culture.
Selecting words and nonverbal communication appropriate to a given setting.

4. *The primary health care worker understands how different people value time.*

Appreciation of how time is valued in different cultures is essential to the primary health care worker. Much preventive and promotive health care requires action in the present which substitutes for more serious future actions. If a culture reveres the traditions of the past, the concept of future planning may be difficult to accept; on the other hand, a future-oriented culture might have difficulty in undertaking daily work responsibilities. Primary health care workers will find it easier to serve their communities if they can come to terms with their own and the communities' perceptions of time.

Understanding time involves:

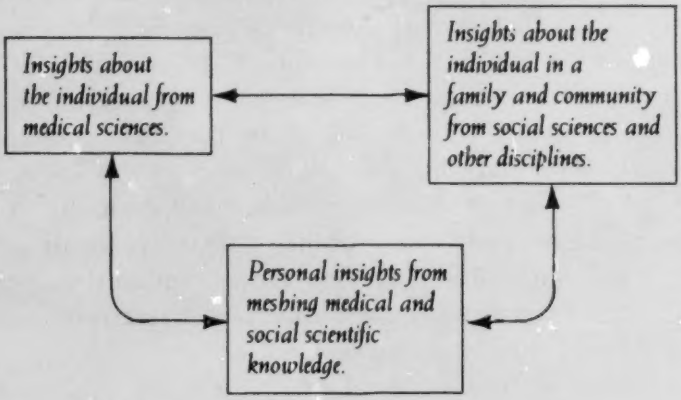


5. *The primary health care worker uses knowledge from various disciplines.*

Primary health care workers bring knowledge from various disciplines to bear on their work. This knowledge is important for the well-being of the patient and the community. The social sciences have provided us with a wealth of information about individuals and communities. This information can tell us a lot about the health of a patient or a community. Likewise, the humanities, including history and ethics, have long provided insight for the health care professions. By examining the traditional customs of a community, using knowledge from a variety of fields, the

primary health care worker can serve the medical needs of the community more realistically.

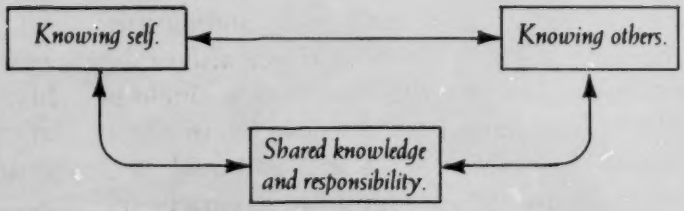
Using knowledge from various disciplines requires:


Insights about the individual from medical sciences.
Insights about the individual in a family and community from social sciences and other disciplines.
Personal insights from meshing medical and social scientific knowledge.

6. *The primary health care worker displays empathy.*

The primary health care worker is concerned, above all, with people. Involvement with people can be such that both the one serving and those being served benefit. Conversely, involvement may benefit no one. Empathy, or caring, involves several issues. Primary health care workers should have enough confidence in themselves to understand the relationship between personal goals and community goals. Leadership by the primary health care worker should be readily relinquished as individuals, families, and the community itself assume responsibility for aspects of health care.

Empathy involves:



The Acquisition of Social Process Skills

Primary health care workers can be encouraged to develop the skills that all humans can possess: perceiving, communicating, understanding time and social settings, applying knowledge from other disciplines, and displaying empathy. All people possess the potential skills of thought and, through systematic application of thinking and analysis, can complete the necessary tasks. As a person becomes increasingly aware of how thought processes and their associated analysis, generalization, predicting, and judging operate, he can intentionally select a mode of thinking which is most appropriate in the situation at hand. The relationship of thinking to knowing is critical to health workers as they apply the technical knowledge and social process skills they have acquired to the health care of the individual and the community.[3]

Three types of thought are discussed here: that involving new and existing knowledge; that involving uncertainty; and that which judges and evaluates.

1. *Thought involving new and existing knowledge*

The primary health care worker acquires a body of knowledge during training, but this is not always useful as it is. Technical knowledge must be adapted and modified to meet different medical situations; it must be brought to bear on situations for which there is no immediate answer; it must be added to and amended as medical science advances. The primary health care worker must therefore continually be able to assimilate, classify, organize, define, and synthesize new knowledge, integrate new facts into an existing body of knowledge, and reject that knowledge which is not useful or has been superseded.

2. *Thought involving uncertainty*

People continually are being faced with the unknown

and must be able to respond to it. Primary health care workers should be encouraged to respond to uncertainty and the unknown. This can be accomplished by a variety of methods:

- *Asking useful questions,* which involves the ability to determine what type of question will evoke the appropriate knowledge to propel a situation forward. Finding answers is often only a matter of asking the right questions. A useful question may open up a relatively unexplored field.
- *The ability to elaborate* involves developing a concept that may begin as a simple idea from sources outside the individual. Such elaboration often increases the scope and meaning of the original idea.
- *Sensitivity to problems* is seeing, discovering, and appraising gaps and deficiencies in persons or in the social setting and developing a capacity to respond constructively. This often stimulates other types of creative thinking, for the person who is sensitive to problems is alert to the components of a situation and is able to discriminate between problems of major and minor concern.
- *Displaying originality* involves thinking which has unique or unusual elements. Such thinking ordinarily has elements of novelty, freshness, and cleverness.
- *Showing flexibility* is the ability to adapt to any set of circumstances and cultural surroundings.
- *Seeing causes and relationships* is the ability to see the central reason for action. If one is to see the complexity of a situation, this skill must be developed.
- *Predicting consequences* involves seeing the potential outcome of a contemplated course of action.

3. *Thought which judges and evaluates*

This kind of thought weighs and selects a course of action. The skills discussed below are necessary for making judgments.

- *Comparison* is the viewing of two or more objects, persons, or situations in order to find likenesses and differences. An ability to develop criteria for discrimination is important in the development of this skill.
- *Analysis* involves breaking the whole into parts so that the features of the whole may be understood.
- *Classification* and interpretation of data involve making sound generalizations that permit various sources of information about the same topic to be linked.
- *Criticism* involves seeing the worth or worthlessness of a course of action, situation, or product. It involves detecting overgeneralizations, ambiguities and inconsistencies, and verification of sources of information.[4]

Putting Thought into Action

We have considered the personal qualities and process skills needed by primary health care workers and the types of thinking which assist in the acquisition of these skills. How shall these be translated into action, as primary health care workers help individuals and the community? The decisions which primary health care workers must make are often broad in scope.

Decision-making is critical to action. Therefore, as a first step, the primary health care worker must clarify his own values and the meaning of these values within the situation under consideration. Perception is critical to such clarification, and empathy is essential if one is to examine

one's general value system in relation to that of others. Depending on the nature of the decision, skills associated with thinking about the known and dealing with the unknown are necessary. Thought processes of judging and evaluating are brought to bear in making critical decisions.

Any decision must take into account the positive and negative consequences of particular actions. In health care, these consequences may be very serious. Primary health care workers are making decisions which influence the lives of others and which use scarce resources. Therefore, they must be sensitive to the consequences of their decisions.

In considering a decision, the decision-maker also has to examine alternatives. Information should be assembled to guide in the selection of one alternative over another. However, it cannot be expected that enough information will always be available to allow for a comprehensive assessment of alternatives. Decision-making may ultimately be a question of judgment.

Although they act on behalf of others, primary health care workers are accountable to individuals and the community for their decisions. Once decisions are made, however, primary health care workers have to accept their consequences.

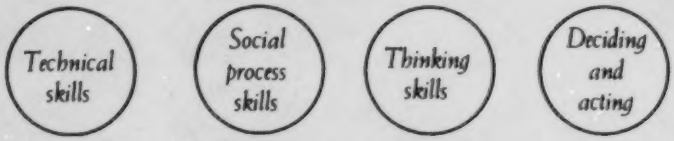
In Summary

We assume that primary health care workers need various skills and kinds of knowledge if they are to perform their tasks successfully. The remainder of this book is devoted to the development of the technical skills and knowledge needed by primary health care workers. This chapter has presented another set of skills—social process skills—which include such basic human skills as knowing, communicating, and understanding.

Primary health care workers can be most effective if they possess:

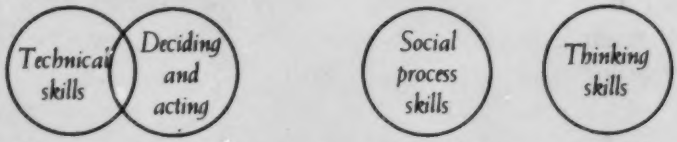
- Adequate technical knowledge and skills.
- Social process skills.
- Critical thinking abilities for acquiring and using both technical skills and social process skills.
- The ability to decide and implement the wisest courses of action in given situations based upon the utilization of technical knowledge, social process skills, and critical thought.

Technical skills and knowledge, social process skills, thinking, and deciding might be presented in four circles:



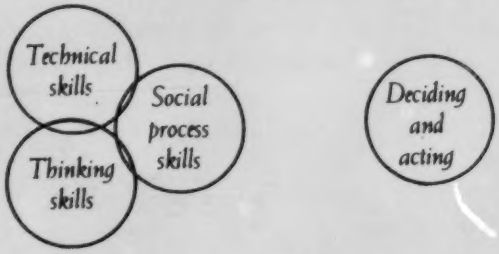
The four types of skills may be taught separately. Little integration of them occurs in practice.

Or two of the circles may intersect. For example, technical skills and deciding and acting may intersect:



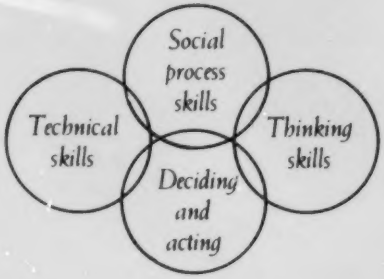
In such cases, persons may act and utilize technical knowledge. However, understanding of the context and empathy may be lacking.

An individual might possess three sets of competencies: social process skills, technical skills, and thinking skills:



If, however, the individual does not possess skills that enable him to make decisions and act, all the individual's personal knowledge will not come to bear upon the situation of which the individual is part.

Primary health care workers need to display, simultaneously, skills in all four of the areas discussed: technical skills, social process skills, thinking skills, and deciding and acting:



When all four sets of skills are developed in a balanced manner, primary health care workers are most likely to develop an understanding of their roles. Only then can they play a significant part in the health of communities.

Notes

1. Louise M. Berman, *New Priorities in the Curriculum* (Columbus, Ohio: Charles E. Merrill Publishing Company, 1968).
2. Louise M. Berman and Jessie A. Roderick, *Curriculum: Teaching the What, How, and Why of Living* (Columbus, Ohio: Charles E. Merrill Publishing Company, 1977).
3. Louise M. Berman, *From Thinking to Behaving* (New York: Teachers College Press, 1967).
4. Robert H. Ennis, "A Concept of Critical Thinking," *Harvard Educational Review*, 32 (Winter, 1962), 81-111.

PART II

The Health of the Community

Introduction

This part is directed at training the primary health worker in carrying out his or her responsibility to families and communities. The instructional content and learning strategies are based on the health status and needs of the families and communities served.

The primary health care worker is concerned with health as well as illness in defined populations, and the focus of this section is on the prevention of disease and the promotion and maintenance of health. Primary health care workers work with the community, and others concerned with development, to implement activities characterized by minimum technology and low cost that are culturally acceptable to the community.

Two assumptions underlie this program. First, that health is the result of a conscious attitude on the part of the individual and is a matter of personal responsibility. Second, since the social, economic, and cultural environments influence the health behavior and health perceptions of groups, it is often possible to make major improvements in the health of a population by relatively modest changes in cultural behavior, economic standards, or social institutions. The role of the primary health worker is to help families and communities modify attitudes that are detrimental to health.

The material in this part is organized into six comprehensive chapters: Health Education, Nutrition, Population, Health Services, Prevention and Control of Disease, and Health Data.

2
HEALTH EDUCATION

Educating people to change their behaviors in order to prevent disease and to maintain health is probably the primary health care worker's most important type of activity. A health education program requires three kinds of careful planning:

- *Diagnosing* or assessing the health needs, problems, attitudes, and behavior of individuals, families, and communities at risk of illness, then deciding which of those ways of behaving can be changed by education, and how they can be changed
- *Designing* and testing a health education program with the participation and support of the people who will be involved in it
- *Coordinating* the program with other development workers and organizations that can assist in development and education

When a thorough diagnosis of the community is completed and has taken into consideration all the issues, successful implementation of a health education program will be more acceptable to the participating or target group, and more likely to lead to internal motivation that will change behavior.

Instructional Content

Before designing and implementing a health education program, the primary health care worker must understand as much as possible about the general socioeconomic situation and related epidemiological patterns of illness (and

their reasons) in families and communities. There are several techniques for surveying and analyzing these patterns. These techniques will help the health worker decide:

- What illnesses are most prevalent.
- What vectors or carriers are responsible for the prevalence or incidence of these illnesses.
- What personal and public health measures could be taken to prevent such illnesses.
- Who is most vulnerable to those illnesses, who is likely to respond to education, and who should be the prime target group of the educational system.

To promote an effective health education program, the health care worker must look beyond the known illness patterns to the personal attitudes, behavior, and community activities which cause or encourage the spread of those illnesses. The health care worker must determine also which of the health-related attitudes and behaviors contributing to the spread of illness can be changed by health education. Then the health worker is ready to work with community representatives in designing an appropriate educational program.

1. *Assess community health problems.*

Using information available from health officials or other sources, the primary health care worker analyzes carefully the health problems of the community. People can be helped to prevent illness by knowing what the most important illnesses are, how they spread, how they are affected by people's behavior, and how people can learn to change that behavior.

2. *Determine health behavior.*

It is important to find out *why* the at-risk groups are

vulnerable to health problems. Which kinds of personal behavior (e.g., diet, hygiene, waste disposal, fertility) are likely to promote or increase the chances of health problems? Individual and group attitudes, feelings, ideas, beliefs, and customs lead to those behaviors and all aspects of those health-related attitudes and behaviors should be investigated—range, frequency, intensity, and persistence—in order to determine which attitudes can be changed by education. The factors under consideration might include:

- *How important* or deeply held are these attitudes?
- *How long* have these attitudes and behaviors been held?
- *Who* teaches or passes on these attitudes to groups at risk?
- *What new ideas* can be encouraged because of traditional attitudes? That is, what new ideas can be introduced which do not conflict with old ideas?

3. *Identify high-priority at-risk groups as target groups.*

Because of the limited availability of primary health care workers and other educational resources, health care workers must decide which groups and individuals are:

- Most in need of education because of critical health risks.
- Most likely to be receptive to the introduction of ideas affecting health behavior.
- Most likely to be *able* to change their behavior (e.g., ability to change some aspects of diet) once they have accepted new ideas (traditional diet is deficient, and the new foods are needed).

These characteristics will help to indicate which groups should be the primary target group(s) of the educa-

tion program. Initial educational "success" with a more receptive group early in the educational program will increase the chance of success with a more difficult group at a later time.

4. *Who are the leaders, teachers, communicators?*

The health worker also should look at the channels of communication within at-risk groups in order to determine which members of the family and community would be most effective in educating others. What is the role of the father or mother in making decisions for the family about size, diet, sanitation practices, expenditures, etc.? Which political, religious, tribal, or other community leaders influence decisions affecting health, nutrition, or fertility? Which health-related subjects should be communicated by whom?

Those who may be important in a health education program are traditional healers, midwives, tribal chiefs, religious leaders, schoolteachers and administrators, political leaders, trade union leaders, and leaders of voluntary organizations.

Traditional healers have a central role to play in a health education program. They, as well as others, should be brought into the planning and implementing of the program from the very beginning.

5. *Involve program participants in planning.*

The involvement of key community individuals and groups in developing the educational program is essential if it is to be accepted and effective. The primary health care worker should make sure that:

- The most significant people in the target community are involved in planning.
- The role of the people should not be superficial but serious and effective.

- The needs and views of all groups in the community, and not just the most powerful or numerous, are considered.
- Specific appropriate and realistic program goals and objectives are agreed on.
- The community is fully involved in implementing (as well as planning) the program.

Planning the health education program with individuals or groups in the community which most influence health behavior will help to insure that people's wants and needs are met.

6. *Design appropriate educational content.*

The messages of the health education program must be understandable, acceptable, and possible for the people to act on. For example, mothers can be taught to take simple, important steps to keep their children healthy:

- Bring children for immunizations.
- Breast feed for about two years.
- Recognize "danger signals" like diarrhea and coughing.
- Wash hands before touching food.
- Keep flies and dirt away.
- Give child salt and sugar water when he has diarrhea.
- Wash child to prevent skin and eye disease.

For others, it is important to recognize the dangers of communicable diseases:

- Their causes and carriers
- How they are controlled

Everyone should know about personal hygiene and sanitation:

- Bathing and body wastes
- Using safe water
- Controlling pests and animal wastes

7. *Plan for appropriate settings.*

The educational program should be held at a time and place most accessible and comfortable for the participating community. This may include:

- Community meeting places or centers.
- Home visits or small group discussions.
- Clinics or health centers.
- Schools, clubs, folk-singing gatherings, or dances.

Group meetings should be carefully planned by:

- Meeting in a known, traditional place.
- Adequate publicity well in advance of occasion.
- Comfortable place: size, temperature, quiet.

8. *Use appropriate teaching aids/methods.*

The primary health care worker should learn to develop and use mass educational methods when available and to develop visual aids such as posters, blackboards, flip charts.

Learning Strategies

1. *Assess, for a particular community, the most important and urgent health problems and the kinds of behavior which affect them.*
2. *List all traditional customs, beliefs, and practices in a community which are beneficial and harmful to health.*
3. *Discriminate between the kinds of health practices in the community which affect only the individual and those which affect others.*

4. *Determine those members of the community most at risk and the changes in health behavior which would reduce or eliminate those risks.*
5. *Identify those in the community who most influence health behavior and why they do so. Develop ways of involving them in a health education program.*
6. *Design, illustrate, and make simple, effective visual aids describing a specific health education topic that uses local examples.*
7. *Plan, in cooperation with a doctor and a teacher from the community, a talk or demonstration on topics in health education suitable for:*
   - *A village gathering.*
   - *A group of primary-school children.*
   - *A group of secondary-school children.*

   Evaluate the results.
8. *Role-play for mothers on the advantages of weaning foods:*
   - *In the home.*
   - *In a village gathering.*

   Discuss the advantages and disadvantages of each setting.

3
NUTRITION

Several aspects of nutrition are essential for health. The primary health care worker should recognize the relationships between health and eating habits and be able to develop nutrition education programs to encourage members of the community to produce proper foods. Educational programs should take into consideration local products, eating customs, taboos, and individual needs. Also, the primary health care worker should be able to identify and teach cooking and storage methods which preserve the maximum nutritive value of foods.

The primary health care worker should know how to detect the signs of malnutrition. His or her responsibilities include surveillance of the overall nutritional status of the community as well as the planning of modified diets for a particular sick individual.

Instructional Content

1. *Nutrition and health*

- Growth and nutrition:
  - Weight at birth
  - Weight for age
  - Arm circumference
  - The differences between men and women
- Nutritional requirements, including:
  - Proteins or body-building foods
    - Role
    - Essential amino acids
    - Sources: animal and plant
    - Protein mixture
    - Protein content of local foods

- Energy foods
  - Energy
  - Sources: oils and fats, carbohydrates, staple foods
- Vitamins and minerals or protective foods
  - Role of each
  - Sources
  - Best local foods for each
- Water
  - Preservation of original sources and improvement of quality
  - Methods to make water safe to drink

- Adjustment of nutritional requirements based on age, activity, and climate
  - 0 to 6 months
  - 6 to 10 months
  - 10 months to 3 years
  - 3 years to adolescence
  - Adulthood
  - Pregnancy and lactation
  - The aged
- Infant feeding, including:
  - Advantages of breast feeding
    - Provides antibodies
    - Psychosocial development
    - No preparation needed
    - Prevents infection
    - Natural fertility control
    - Balanced nutrients
  - Disadvantages of bottle feeding
    - Infection (diarrhea, dehydration, death)
    - Unbalanced diet if too dilute
    - May hinder psychosocial development
    - Costly
    - Needs preparation and conservation
  - Indications for bottle feeding
    - Insufficient supply of mother's milk
      - Acute sickness of mother
      - Absent mother

Techniques for feeding
Preparing formula
Use of cup and spoon

2. *Local foods and eating habits*

- Local and imported foods:
  - Composition
  - Accessibility
  - Cost per unit
- Organization and methods for local production and their relationship to food availability in the community, including:
  - Plantation
  - Cultivation
  - Irrigation
  - Harvesting
  - Rotation of cultivation
  - Storage
  - Transport
- Distribution and trading:
  - Vegetables
  - Cereals
  - Fish
  - Meat and derivatives
  - Poultry, eggs
  - Milk
- Survey of traditional customs, beliefs, ways of life, including:
  - Customs
  - Traditions
  - Taboos in relation to health
  - Distinguish among:
    - Beneficial customs
    - Customs of unknown consequences (eating clay)
    - Harmful customs (avoiding water in cases of diarrhea)
    - Harmless customs

- Changes of nutritive value during cooking and alimentary hygiene, including:
  - Cooking of vegetable products
    - Roots
    - Cereals
    - Greens
  - Cooking of animal products
    - Fish
    - Meat
- Destruction of certain vitamins and minerals by:
  - Oxygen
  - Water
  - Time
  - Heat
- Cooking methods and their advantages and disadvantages:
  - Boiling
  - Steaming
  - Grilling
  - Baking
- Cooking materials and their advantages and disadvantages:
  - Pottery
  - Enamel
  - Aluminum
- Conservation: General information concerning eating habits in different regions of the country, also national and worldwide nutritional problems.

3. *Malnutrition*

For each disorder, study the etiology, the symptoms, the treatment, and the indications for referral:

- Kwashiorkor
- Marasmus
- Nutritional anemia

- Anemia due to blood loss
- Iodine deficiencies (goiter)
- Hypovitaminosis:
  - Vitamin A — xerophthalmia
  - Vitamin B_1 — beriberi
  - Vitamin B_2 — photophobia
  - Vitamin B_6 — anemia, convulsions
  - Nicotinic acid — pellagra
  - Folic acid — anemia
  - Vitamin C — scurvy
  - Vitamin K — hemorrhage
  - Vitamin D — rickets
  - Vitamin E — anemia, sterility (not yet proven)
- Obesity:
  - Infants under 1 year old
  - Adolescents
  - Adults
- Hypervitaminosis

4. *Nutrition education and evaluation*

- Review of health education principles, including:
  - Motivation and group dynamics
  - Content based on community diagnosis
  - Start program where signs of change and readiness for progress are seen
  - Evaluation as an integral part of the program
- Principles for evaluation of a nutritional program
- Choice of subjects
- Preparatory contacts
- Equipment
- Procedure: registration, compilation of information, measurements, clinical observation
- Data analysis

Learning Strategies

1. *Measure the arm circumferences of a group of children from 1 to 5 years of age. Analyze.*

2. *Measure the weights of a group of children and analyze with regard to age, sex, and chronological order in family.*
3. *Demonstrate and interpret the road-to-health chart (growth chart).*
4. *Make a list of the foods eaten by an average family and indicate the approximate nutrient content of each per 100 grams.*
5. *Estimate the nutritional needs of a 1-month-old and a 6-month-old baby and compare with the nutrient content of an average daily supply of human milk. If insufficient for the older baby, indicate how to supplement.*
6. *Note all the ingredients eaten during three days and calculate the quantity of proteins, carbohydrates, and fats ingested. Calculate the amount of calories. Discuss.*
7. *Using the local foods, prepare a well-balanced diet for one of the following:*
   - *An under-5 child*
   - *An adolescent*
   - *An adult engaged in sedentary activity or heavy work*
   - *A pregnant woman*
   - *An aged person*
8. *Compare the growth of a certain number of breast-fed babies aged between 0 to 6 months with the same number of babies of the same age who are bottle fed.*
9. *Compare the rate of gastroenteritis among breast-fed and bottle-fed babies.*
10. *Demonstrate the preparation of a formula. Prepare a bottle for different ages. Practice use of cup and spoon.*
11. *Leave a bottle standing for six to eight hours and take a culture of the nipple. Observe the process of clotting of the milk.*
12. *Study the food habits of a family with regard to:*
    - *Number of persons to feed.*
    - *Number of meals per day.*
    - *Percentage of budget devoted to food.*

13. *Establish a list of foods produced locally for family use and for cash income. Prepare a food budget for a family of five.*
14. *Compare food prices and their seasonal variations.*
15. *Describe the traditional methods of local production and indicate if appropriate. If not, how could they be improved?*
16. *By using a student's family and neighbors, estimate how many of these people grow food and how the food is used. Estimate the producing cost and the retail cost.*
17. *Study the approximate cost of producing locally some of the imported goods —eggs, for example.*
18. *Describe a food cycle in writing or drawing, i.e., from planting to eating.*
19. *Prepare a summary of local food habits. Indicate how these could be improved for better utilization of local resources and better nutrition.*
20. *Study the local cooking habits, utensils used, fuel, volume measures, conservation. If needed, teach more appropriate methods.*
21. *Study the different local dishes prepared by an average family and see how these can be adapted to the infant without undue preparation.*
22. *Demonstrate recipes containing a combination of foods that will have the essential amino acids.*
23. *Cultivate a garden at a training center or hospital with products of protein content.*
24. *Compare the eating habits between two regions either in your country or in another country you know well.*
25. *Perform a clinical examination on a few undernourished infants. Include:*

    - *History*
    - *Observation: conjunctiva, cranial circumference, joints, and skin texture*
    - *Growth curve*

    According to the evaluation, teach the appropriate dietary regime.

26. *Analyze available studies on endemic goiter or other malnutrition cases.*
27. *Compare the geography and habits of an area where goiter is found with another where there is no manifestation of the disorder. Analyze.*
28. *Prepare a hypocaloric diet for a child, an adolescent, and an adult.*
29. *Control the weight of overweight patients and teach them how to manage their hypocaloric diet.*
30. *Using local products, prepare a diet for a patient suffering from gastritis or hepatitis and teach the diet to the patient and the family.*
31. *Give advice to a diabetic or a hypertensive patient on how to follow their diet.*
32. *Prepare the salt-sugar solution for severe diarrhea.*
33. *Prepare teaching materials for nutrition education use:*
    - *Posters*
    - *Flannelgraphs*
    - *Black-and-white photos, if available*
    - *Slides with written comments and explanation, if available*
34. *Role-play on a subject related to nutrition.*
35. *Identify the nutritional needs of vulnerable groups in the community. Prepare a plan of action in order to satisfy needs.*
36. *Organize nutritional activities in the context of primary care at the village or community level. Coordinate these with agricultural activities if possible.*
37. *Conduct an individual nutritional survey of community children at an under-5 clinic, primary and secondary school.*

4
POPULATION

The quality of human life and the prospects for continued human survival within an ever-limited and often hostile environment are subjects of considerable attention from all those seeking to determine the optimal balance between population and quality of life. Community health is one discipline especially concerned with such issues.

In the past, human fertility and mortality were substantially in balance. Within the last century, however, this balance has been upset, and rapid population growth has become a serious problem. When population trends are compatible with basic social values, family organization, and goals of society, as well as with resources and services, then population will no longer be viewed as a problem.

This chapter reviews some of the problems associated with rapid population growth; discusses social determinants of population size, distribution, and composition; describes methods of fertility control; and analyzes the components of clinical services for defined populations served by the primary health worker.

Instructional Content

1. *Problems associated with rapid population growth*

    - Environmental hazards generated by expanded urban population.
    - Food deficiencies, as agricultural expansion lags behind population needs; most people in Third World countries already face caloric/protein deficiencies.
    - Poverty and illness become endemic and self-perpetuating when oversized families cannot

provide shelter, education, health, and recreation to their members.

2. *Population size, distribution, and composition*

- *Social determinants.* Population is never static. The extent and direction of population change are in large part determined by various social, economic, and political aspects. In agrarian societies, for example, a poor crop will lead to population decline, either because some people will move away to seek better land or because the resulting food shortage will precipitate a rise in the death rate. A good crop year, on the other hand, will lead to a population increase, because people will marry and have children, and because those children that are born will have a greater likelihood of surviving.
- *Population size.* How many people are there in the area served by the primary health worker?
- *Population composition.* What are the dominant traits and characteristics of the people in the area?
- *Population distribution.* Where are the people located within the area?

3. *Population changes*

- Ways in which any population can change:
  People are born: *fertility.*
  People die: *mortality.*
  People move into or out of the area of habitation: *migration.*

In summary, the primary health worker must be concerned with determining the following:

- The size, composition, and distribution of a defined population under his/her care

- Changes that have occurred or are occurring in the above variables
- The processes or trends in fertility, mortality, and migration by means of which population changes have been or are being achieved

4. *Methods of fertility control*

When one speaks of a woman's *fertility* one is referring to the number of children she has actually borne. *Fecundity*, on the other hand, refers to the number of children a woman is biologically capable of bearing. The level of fertility is most commonly measured by the *crude birth rate*.

The ideal fertility control method would be:

- Effective.
- Safe.
- Reversible.
- Acceptable to everyone who wishes to practice family planning.

Several methods now in use approach this ideal, yet none achieves it. It is therefore essential that the primary health worker be acquainted with a variety of methods in order to advise each family on the best choice currently available.

The contraceptive methods listed below are classified primarily according to whether physician supervision is necessary, although some could be provided by the primary health worker if he/she has had appropriate training. This classification is administratively useful because of the medical framework in which health services are presently provided. The primary health worker does not work in isolation; therefore, if a family selects a method beyond the worker's competence, a referral would be in order.

Methods within the competence of the primary health worker:

- Condoms
- Aerosol foams
- Creams, gels, and other vaginal methods
- Rhythm

Methods requiring physician supervision:

- Oral steroids (Pill)
- Intrauterine devices (IUD)
- Vaginal diaphragms
- Surgical methods: sterilization and abortion

5. *Clinical services*

There are some other elements essential to family planning:

- Information: the family must be aware of options in fertility control.
- Medical services, which include periodic supervision.
- Location: methods should be available on a continuous basis and should be near the community being served.

Learning Strategies

1. *Discuss the effects of migration on work in your community.*
2. *Record the number of births in one week and compare with the number of deaths in the same period.*
3. *On the basis of population information on your community, prepare a population pyramid by age group and sex.*
4. *Discuss attitudes toward traditional birth control measures found in your community.*
5. *Give a short speech on available methods of fertility control in the dispensary/health center.*

5
HEALTH SERVICES

The discussion of health services is organized into three sections: administration, planning, and cost.

Administration

The primary health care worker may be responsible for organizing the day-to-day operation of the dispensary, health post, or health center. Because these are located, in most cases, in isolated areas that have scarce resources, he or she is dependent on good management practices.

Examples of the primary care worker's activities include work scheduling, recording vital health statistics, obtaining and distributing supplies, and budgeting.

Instructional Content

In order to provide an integrated health service that is of value, efficient and effective within the community, it is necessary for primary health care workers to organize and monitor the activities of all the services available. This is done through continuous monitoring, insuring that the work efforts in all sectors are well integrated, coordinated, and economically efficient; that the services are available and culturally acceptable to as many of the community as possible; and that the health staff work with the community, taking into account their behavioral attitudes, while giving the highest possible standard of care.

Learning Strategies

1. *Describe orally and in writing a defined community and its health activities/problems.*

2. *Describe the various levels of health personnel, their work, their interrelationships, and their relationship with the community.*
3. *Know the roles of and how best to communicate with local, regional, and national government authorities.*
4. *Establish and maintain for a week an inventory of equipment and supplies in, for example, the dispensary.*
5. *Compare simple methods of filing, storing, and keeping registers, and accounting for the drugs supplied and dispensed.*
6. *Describe how to maintain equipment, e.g., bicycles, typewriters, refrigerators, and weighing scales. Be able to teach the community to do likewise.*
7. *Learn how to compose an official letter, how to write a letter of referral, and how to write notes on patients clearly and accurately.*
8. *Compile the various government and nongovernment reports that are required weekly/monthly/yearly. Compare the various methods that exist for obtaining all the necessary information, and know how to write a report in a logical, concise manner. Identify what information can and should be discussed with the community.*
9. *Discuss how to organize/chair a meeting, seminar, or lecture for various groups: students at a public school, teachers, workers, a community group, other development workers.*
10. *Identify the various methods of continuous self-assessment and evaluation. Discuss how to integrate these into the supervision of village health workers or aides.*
11. *Learn how to organize and head a simple community survey.*
12. *Develop a filing and reference system for any materials such as students' written community projects or the results of any community survey. Use the system for finding materials.*

Planning

In order to develop suitable and effective health care services, the primary health worker must know the various factors relevant to his/her community. In understanding

these factors, the primary health worker should be able to develop simple plans for health services in the community and know how community services fit a broader regional or national health plan. The planning process assesses existing services and describes alternate or extended health services. These are, of course, based on particular objectives and limited by available resources and social policies.

Instructional Content

Factors for consideration in planning for health services include:

- Activities of government agencies, particularly:
  - Education
  - Community development
  - Agriculture
  - Health
- National, local, or community policies
- Local population factors: density, growth, age distribution, and migration (urban ⟷ rural)
- Communications:
  - Reliance on verbal and/or handwritten communication
  - Availability of government postal and telephone systems
- Climatic and geographical conditions:
  - Hot, warm, cold, humid, and dry
  - Daily and seasonal changes
  - Seasonal variation of disease
  - Mountains, savannah, forests
- Water supply:
  - Source, quantity, seasonal variation
  - Quality, amount, and type of pollution
  - Number of covered wells
  - Availability of piped water supply
- Refuse disposal:
  - Habits
  - Availability and use of latrines: individual/communal

Availability and use of refuse pits: individual/communal

- Availability of food and agricultural information:
  - Source of calories, proteins, vitamins, and carbohydrates
  - Relationship between food and cash crops
  - Habits and taboos
  - Crop disease control
- Money:
  - Cost of everyday necessities, housing, education, health care
- Control of food:
  - Growing, selling, buying, storage, transport
- Housing:
  - Type of materials used in construction
  - Average number of occupants per house, urban/rural differences
  - Relationship between the state of housing and frequency of illnesses
- Extent of health services:
  - National government
  - Local government hospital, health center, dispensary
  - Mission
  - Other
- Availability and characteristics of health workers:
  - Government doctors, nurses, midwives, technicians
  - Private doctors, nurses, midwives, technicians
  - Traditional practitioners, community health workers
- Availability of money for health purposes:
  - Government, community
  - Mission
  - International, WHO, OXFAM, others
- Attitude toward:
  - Traditional medicine
  - Private health sector

- Availability and facilities for storage of:
  Drugs, vaccine, equipment, supplies
- National and local regulation of:
  Drugs, food, imports/exports
- Disease:
  Control, eradication, quarantine measures
- Work and social life:
  Recreation, educational facilities, housing for individuals, families, and communities

Guidelines for decision-making. Having identified some of the factors which affect the health of the community, and before attempting to solve any one of the problems, it is useful to consider guidelines for the local sequence of moves toward decision-making. The criteria for selection of solutions should be their practicability and their effects upon health problems. The nine steps involved in making a decision are:

- Identify the problems.
- Rank in order of priority.
- Estimate costs.
- Select problems that can be tackled by you (the primary health care worker) with the community.
- Define immediate goals.
- Weigh alternatives.
- Formulate and implement a plan.
- Evaluate for quality, effectiveness, and efficiency.
- Readjust immediate goals if necessary.

Learning Strategies

1. *Summarize the national, local, and community policies with special reference to health. Obtain copies of any health plans of national or local government.*
2. *Discuss the various methods of communication.*

3. *Study the structure of a community, the changing roles of men and women, the use of village development committees.*
4. *Discuss the attitude of the community toward traditional and private medicine.*
5. *Conduct a simple survey, within a defined radius, of the extent of the health services available.*
6. *Do a general census of a village or zone, asking six or seven questions about characteristics of the people.*
7. *Do a simple survey of population factors.*
8. *In any village or town, discuss and make a list of the types of huts/houses observed and of the materials used in construction. Find out the availability and cost of materials needed, and the time and manpower required, to build an average hut/house.*
9. *Make a plan of a village, indicating each house, the distribution of water, refuse pits, latrines, and agricultural land.*
10. *Decide on a list of everyday necessities in the home. Every four months visit the local market:*
    - *Make a list of the locally grown/produced foods available, with their prices.*
    - *Price the list of everyday necessities and note if available or not.*

    Repeated visits may show fluctuations in availability of goods, their prices, and their relevance in budgeting, malnutrition, etc.
11. *Describe the different social activities in the community, their value and effect upon the community.*
12. *Identify the local and national geographical and climatic variations and describe their effect on transport, food, health, and illness.*
13. *Find out sources of water supply and methods of refuse disposal in a given community.*
14. *Make a model of a village from local materials, planning the ideal position of latrines in relation to houses and water supply.*
15. *If available, take photos of various diseases; compile a reference book with simple commentary. Take photos of health centers, dispensaries,*

and any mobile clinics, showing how they function, compile a commentary. Take photos at different stages of building latrines, water wells, piped water supply, houses. Write a commentary.

16. *Describe the activities of the government departments noting where, and from whom, advice can be sought, e.g., Agriculture, Education.*
17. *Investigate national and local methods for drug control and distribution.*
18. *Observe and list the presence of insects and animals in the community and remark on their use or harm.*
19. *Attend a primary school to perform simple visual, hearing, and walking examinations on "healthy" children.*
20. *Discover if there are any "self-help" projects in the community, and what possibilities exist to implement them.*
21. *Develop a health plan for the local community as follows:*
    - *Talk with members of the community and listen to the health problems, and therefore needs, as stated by them.*
    - *Decide which problems identified above are the most important.*
    - *Make a list of all the materials and equipment necessary to address these problems, with known or estimated price.*
    - *Identify the problems in a given community that can be solved with your knowledge and guidance, with the help of the community. Describe the relevant authorities who should know about the other problems.*
    - *State clearly in writing and orally what you intend to achieve in the community within a given time period.*
    - *Make a written plan of how you intend to achieve your objectives.*
    - *Review your plan for accuracy.*

Cost

The purpose of learning about the cost of health services is to be able to make decisions about how to make best use of the resources available. The primary health care worker should know how costs are determined as well as the

sources of funding for health services, and should be able to monitor the flow of money and other resources in and out of the primary health care program.

Instructional Content

The source of revenue for health care in most countries is the general budget, e.g., taxes and export earnings, supplemented by money and other resources obtained from various government institutions providing health care and health-related services, and from contributions by private organizations, technical aid programs, the industrial sector, missions, and the community.

In order to make best use of available resources, it is necessary to explore the various factors which affect their availability, their flow in and out, and the possibilities for change.

1. *General Cost*
    - Income:
        - Source of finance, e.g., government, bilateral aid, mission, community
        - Special grants, e.g., for MCH programs, malaria/TB control programs, sanitation programs
        - Donated drugs and equipment
        - Fees for drugs and services
    - Outgoing:
        - Salaries
        - Drugs and equipment
        - Transport vehicles and their maintenance
        - Buildings and their maintenance
        - In-service training
2. *Planning Expenditures*
    - Planning/priorities:
        - Materials for nutrition and sanitation education or new technical machinery

- Decisions about cost:
  - Comparative costs of kinds of drugs
  - Comparative costs of transporting the community or the health worker
  - Comparative costs of the time of different members of the health care team
- Other factors:
  - Budgeting, day-to-day account of expenditures and income
  - Banks or cooperatives, general workings of
  - Inventory, composition and use of
  - Evaluation, effectiveness of money spent

Learning Strategies

1. *Make a list of day-to-day expenses in the family, dispensary, health center, or hospital. Repeat every six months to compare prices.*
2. *Compile an inventory of every item in the dispensary and its cost, and identify the reasons for keeping an inventory.*
3. *Find out the cost of equipment and drugs, bearing in mind the comparison of actual cost and future expenses.*
4. *Find out the various possible sources of income in the family and in a dispensary.*
5. *Identify the availability of donated drugs and equipment.*
6. *Compare the length of training and general salary structure for all health workers.*
7. *Learn how to read and interpret a bank statement. Learn the general working principles of a bank and a cooperative.*
8. *Determine how a dispensary can become financially self-sufficient, and the role which the community can play in achieving and maintaining this state of financial independence.*
9. *Assess the advantages and disadvantages of primary health care workers being voluntary, government employees, or paid by the community.*

6
PREVENTION AND CONTROL OF DISEASE

The prevention and control of disease is presented in five sections: epidemiology, zoonosis, environmental health, occupational health, and disasters.

Epidemiology

Epidemiology is the study of patterns of health and illness in human populations, and the factors which affect these patterns. Epidemiological studies are used to determine the type of health services which are needed and to evaluate the success of existing health care programs. Statistical methods, described here and in the chapter on health data, are often used to conduct epidemiological surveys and studies. Since the primary health care worker is responsible for reporting and interpreting facts about health in the community to the government or other authorities, he or she should be able to use simple epidemiological methods for the purpose of assessing correctly the local patterns of health and illness and for communicating officially any alarming signs of variation.

Instructional Content

In all epidemiological studies, it is necessary to compile simple, reproducible vital statistics and then understand how to interpret and use those figures. It is essential in conducting a study that the methods of observation follow an established pattern and that the methods of recording such observations are made in a standardized manner. In this way the results that are obtained can be directly compared with other observations made by other observers or at another time.

1. *Epidemiological methods*

There are three main types of epidemiological studies: descriptive, analytical, and experimental.

a. *Descriptive epidemiology.* This is the first phase of epidemiological studies in which one answers the questions: Who is affected? In what place? And at what time?

The answers to these questions, together with the knowledge of clinical and pathological features of the disease and information about the population and its environment, assist in developing hypotheses about the determinants of the disease. Those are tested by analytical studies.

The distribution of disease is described in terms of three major variables: persons, place, and time.

Persons
Age, sex, marital status
Race, ethnic group, religion
Occupation, education, socioeconomic status
Personal habits: use of alcohol, tobacco

Place
Climatic zones
Country, region, state, district
Urban or rural
Local community, city slums
Institutions: dispensaries, health centers

Time
Year, season, day
Seasonal variations and other cyclical fluctuations
Social trends

b. *Analytical epidemiology.* Two types of study are employed. Case history or retrospective studies: a group of affected persons are compared with suitably matched control groups of nonaffected persons. Cohort studies: a group of persons who are exposed to the suspected etiological agent are compared with matched control subjects who have not been similarly exposed. Compared with cohort studies, case studies have the advantage of being relatively quick, easy, and inexpensive.

c. *Experimental epidemiology.* This involves studies in which one group is deliberately subjected to an experience and is compared with a control group which has not had that experience. Trials on vaccines are examples of experimental epidemiology. In such trials, one group receives the vaccine while the other receives a placebo.

2. *Epidemiological data*

As in clinical medicine, epidemiological data may be obtained in the form of answers to questions, physical examination of persons, and the results of laboratory and special investigations. In assessing the value of a particular method, the following qualities should be considered:

- Sensitivity—ability of the test to detect the condition when it is present
- Specificity—ability of the test to differentiate cases in which the condition is present from those in which it is absent
- Repeatability—the extent to which the same result is obtained when the test is repeated on the same object or material

3. *Epidemiological evaluation*

The purpose of evaluation is to examine the effects of policies and programs on targets such as individuals, groups, and communities in terms of the goals they are meant to achieve. In epidemiology, the relationships of the *agent*, the *host*, and the *environment* are important.

Evaluation is an essential and integral part of a wide range of service programs. Understanding the health care services actually used by a population or various segments of that population requires that attention be given both to the *quantity* of services and their *quality*. Quantity refers to studies of utilization that concentrate mostly on the volume of services, i.e., number of visits to a clinic.

Approaches to study the quality of health care involve:

a. *Structure of the care*—i.e., an examination of whether facilities, personnel, and organization meet a standard accepted by experts as good.

b. *Processes of care*—i.e., the actual performance by some health personnel is examined and compared either with some expert or with a predetermined standard; comparative results are given in range of superior to poor care.

c. *Outcome of care*—i.e., does the care actually protect or improve the health of the persons to be served, and, if so, to what extent?

By using different methods of epidemiological studies, it is possible to determine:

- The state of health of a community.
- The distribution of health care services.
- The incidence and prevalence of disease.
- The identification of causes of disease.
- The influence of the individual, the family, and the community on the state of health.
- The factors in community living which initiate disease and determine the severity of its occurrences and outcomes.
- The means by which the health of a community can be improved.
- The effectiveness, surveillance, and evaluation of health care provided, to insure that the service is needed at the level given, and the objectives are being met.
- Those people at risk within the community.

Existing information is useful in epidemiology and can be obtained from:

- Personal identity cards/under-5 clinic cards.
- Census surveys.
- Hospital, health center, and dispensary records.
- X-rays, photos.

New information can be obtained from special survey cards/forms which are often coded, and from interview forms. The information obtained can be used to determine at-risk groups.

The accuracy of research data depends on the simple design of the record, the accuracy and supervision of observation, and the precision and training of the recorder.

Having identified the needs of a community by epidemiological methods and then decided the immediate objectives—the ultimate of which is the reduction of morbidity, disability, and mortality—and finally having introduced health services to answer the needs, it is imperative to use epidemiological methods to evaluate the effectiveness of the health services. Evaluation is directed to the quality, effectiveness, and efficiency of community health care.

Evaluation should be concurrent and continuous, so that the degree to which the objectives are being met can be determined and appropriate planning devised.

Quality of care includes:

- Number of maternal deaths.
- Under-5 infant rates of low weights, incidence of disease, number and type of vaccination given.
- Has the incidence of gastrointestinal disease been reduced since the introduction of hygiene talks, building and use of good latrines, improvement of water supply?

Effectiveness of care involves the following questions:

- Does the health care benefit those who receive it?
- Does it do more harm than good?
- Is the need becoming less?

Efficiency of care refers to competence of performance and the ability to accomplish the care with a minimum of time, effort, and cost:

- Ratio of useful work performed to total energy expended
- Enquiries into:
  - Availability and utilization of facilities
  - Amount of work performed
  - Resources used
  - Results obtained

Learning Strategies

1. *Conduct simple descriptive surveys, e.g., prevalence of malnutrition or infectious disease in a village, and compare results using different methods, e.g., height/weight, weight/age, arm circumference for malnutrition, urine tests, eggs in the stool for schistosomiasis.*
2. *Find out the numbers and types of vaccinations given at under-5 clinics.*
3. *Collect data on the prevalence of a disease for a sample of people in a community both before and after treatment.*
4. *Calculate the maternal mortality rate, crude birth rate, crude death rate, infant mortality rate, cause of death in a community over a given time period.*
5. *Develop a few statements which clearly summarize data obtained. Draw simple graphs, diagrams.*
6. *Find out what analytic studies have been done in local area or region.*
7. *Teach a village health worker how to keep a register of all births and deaths in a community.*
8. *At the end of each week in a dispensary, analyze and interpret the records of all ambulatory attendances by sex, age, symptoms and/or diagnosis, and treatment.*
9. *Do a study in a village on a selected group looking for the presence of smallpox scars.*

10. *With the previous consent of the rural and/or village zone authorities, every student could follow between one and three families throughout the training program and keep a family record of births, deaths, marriages, and frequency of illnesses.*
11. *From the information available on under-5 clinic cards, antenatal cards, family health cards, and home visiting records, determine those at-risk groups within the community.*

Zoonosis

The purpose of the study of zoonosis is to recognize those diseases and infections naturally transmitted between animals and men, and to be able to work with the community for their prevention and control.

Instructional Content

Diseases are transmitted naturally between animals and man in a number of ways, including:

- Wild animals → man: Salmonella, helminths, Lassa fever.
- Wild hosts → domestic animals → man: trichinosis, bovine TB, toxoplasmosis.
- Domestic animals → man: brucellosis, Q fever toxocariasis, liver fluke, cat scratch fever, hydatid disease, rabies, anthrax.
- Animal → man → animal: human TB in cattle, amebiasis in dogs.
- Man → animal: human TB in cattle, amebic disease in dogs.
- Animal → intermediate host → man: typhus, plague, malaria.

Measures for prevention of these transmissions include:

- Inspection of slaughterhouses.
- Keeping animals in enclosures.
- Adequate hygiene and sanitation education and practice, such as cooking meat adequately.

- Immunization programs for animals and man.
- Killing of rodents and other suspect wild and domestic animals.
- Flea-, louse-, and tick-control measures.
- Vector-control measures.

Learning Strategies

1. *Do a simple survey investigating all animals found locally, their uses, contact with, and danger to the local community.*
2. *Make a list of the common diseases presented at the local dispensary, health center, and hospital. Analyze their relevance to the presence of animals.*
3. *Teach a family in the community how to insure adequate levels of hygiene and sanitation, e.g., adequate cooking of meat and the washing of hands.*
4. *Talk with the community on the advisability of having animal enclosures for pigs, goats, and dogs.*
5. *List the various immunizations available, and other measures for the control of disease. Know how to dispose of a carcass, especially if the death is the result of a serious infectious illness.*
6. *Indicate the relationship between the use of water by the community and the transmission of disease.*

Environmental Health

The purpose of environmental health is to create and maintain ecological conditions that will promote health and thus prevent disease. In order to do this, primary health care workers should recognize the importance of knowing the community. This knowledge includes factors such as water supply, disposal of waste, housing, personal hygiene, and disease control. The health care worker should be able to demonstrate, teach, supervise, and, to a lesser degree, evaluate the different methods which influence the factors in the environment that affect health.

Instructional Content

1. *Factors to be considered* in environmental health include:
   a. *Water.* Availability of water. Sources and storage of water. Use of water. Quality of water. Socioeconomic implications of water. Diseases associated with water.
   b. *Disposal of wastes.* Disposal of excreta. Ideal latrines. Disposal of refuse. Storage of refuse. Collection of refuse. Recycling. Industrial waste/pollution.
   c. *Housing.* Adequate features—ventilation, protection, safety, sanitation, privacy—that would promote an environment where the health and well-being of a family can be enhanced.
   d. *Animals/insects.* Use and harm to the community of local animals and insects and their short- and long-term effect upon the community.
2. *Principles of prevention* in environmental health include:
   a. *Food hygiene.* The availability, preservation, and storage of food in the home, shops, restaurants, and market.
   b. *Disinfection.* To kill harmful organisms by use of heat, hot or dry air, sunlight, chemicals, aerosols.
   c. *Control of disease.* By chemical action, vaccinations, biological methods, fumigation, and techniques for the disposal of bodies if the death is due to a serious infectious illness.

Learning Strategies

1. *Assess the local availability of water. Itemize the various sources of water and its quality. Suggest methods for purification.*
2. *List the community habits for the disposal of excreta, and the local methods of collecting, storing, and recycling waste.*
3. *Assess the various aspects of housing (e.g., materials used, cleanliness, ventilation, safety, and privacy) and comment on their effect upon the community.*
4. *Note and classify the practice of personal hygiene in a home, village, town, and market. Discuss the relation between the standards observed and the states of health and illness.*

5. *Find out the different methods of disinfection, their use, if any, by the community, and their value. Develop teaching methods to assure their future use.*
6. *Visit homes, shops, and restaurants. Discuss the practices observed for the storage, handling, and preparation of food.*
7. *Compile a list of those diseases associated with water and describe their effect upon the community.*
8. *Find possible sources of industrial pollution and discuss their present and future effects on the community.*
9. *List and classify methods of disease eradication, control, and prevention. What methods have been or are practiced in the community? Which control and preventive programs need to be introduced?*
10. *Compare the cost of controlling a disease in the community with the cost to the community of curative care for that disease.*
11. *Describe the different types of latrine construction and discuss their advantages and disadvantages. Supervise the building and maintenance of both individual and communal latrines.*
12. *Describe the various materials and simple methods for constructing buildings, and for building and maintaining roads and remote airstrips.*
13. *Learn how to detect the carrier in the event of an outbreak of food poisoning in a community, the hospital, and the canteen.*
14. *Identify the different methods of disposing of human bodies—especially if a death was the result of a serious, highly infectious illness—and map the location of cemeteries.*
15. *Locate the existing and potential breeding areas of flies, ticks, fleas, cockroaches, mosquitoes, and rodents in a defined community. Learn how to collect samples and/or larvae as well as blood and feces from infected individuals.*
16. *Appraise and describe the findings for:*
    - *Any seasonal variation in the use of water.*
    - *The approximate quality of water used by a family and the purposes to which it is put.*

- *The relationship between the amount of water used in a family and the presence of skin infections.*
- *The relationship between illness in a community and too many people using one source of water.*

Occupational Health

Some health problems are related directly to particular occupations and conditions of work. The primary health care worker should know how to recognize and, if possible, prevent these occupational diseases.

Instructional Content

1. *Factors for consideration* in occupational health include:

   a. *Agricultural settings:*
      - Accidents with machinery and/or hand tools
      - Infectious and parasitic diseases contracted directly or indirectly during the course of work, e.g., anthrax, tetanus, schistosomiasis
      - Exposure to pesticides, insecticides, and other chemicals
      - Extremes of climatic conditions, e.g., temperature, humidity, and solar radiation
      - Lung diseases, due to inhalation of certain fungi (aspergillosis), moldy hay (farmer's lung), and sugar cane (bagassosis)

   b. *Industrial settings:*
      - Mass labor migration, causing complex social and mental health problems
      - Accidents with machinery and dangerous chemicals
      - Danger of cancer from exposure to certain chemicals, asbestos, and rubber
      - Danger of asthma, pneumonoconiosis, asbestosis, silicosis, byssinosis, and aspergillosis, due to the inhalation of certain fumes and dusts
      - Poor ventilation, causing fatigue and therefore

low production and increased risk of accidents
- Compressed air illness (the "bends") in divers working on oil rigs, dams, and bridges
- Danger of accidents or loss of job due to alcoholism, smoking, and/or taking of drugs
- Water and air pollution
- Any labor codes which exist to protect the worker

2. *Principles of prevention* in occupational health include:

- Sanitation and hygiene factors:
  Cleanliness, overcrowding.
  Adequate heating, ventilation, and lighting.
  Adequate sanitary facilities.
  Protection against the inhalation of fumes and dust by the use of masks.
  Food hygiene in canteens.
- Monitor the environment:
  For dust levels, radiation, river, lake, and sea pollution.
- Limit exposure to hazardous processes to minimum number of people.
- Health assessments, as needed, and emergency check-ups.
- Notification of specific occupational diseases.
- Individual and community health education, with special emphasis on alcohol, cigarette smoking, and drug taking.
- Adequate training and supervision.
- Provision and maintenance of adequate accident-prevention measures.

Learning Strategies

1. *Assess and know how to use various emergency facilities and equipment. Discuss the hazards which determine the need for such facilities and equipment in a hospital, training center, school, and factory.*

2. *Assess the incidence and methods of prevention of accidents in local occupations.*
3. *Suggest methods to recognize various diseases related to local industry and agriculture.*
4. *Find out the provisions of any labor code in the country and discover if they are observed in local factories.*
5. *Prepare simple talks on hygiene, accident prevention, and the prevention of disease. Determine the possibility of giving talks in places of local employment and in schools.*
6. *Plan an evacuation in the event of an industrial or natural disaster.*

Disasters

The primary health care worker should know the methods for the prevention, control, and alleviation of natural and man-made disasters.

Instructional Content

Natural disasters include drought, earthquakes, and volcanic eruptions. Man-made disasters include accidents and war. If disasters cannot be prevented, they must be prepared for. Essentially this means the adequate training of the community to deal with the possibility of a disaster.

Examples of potential disaster situations include:

1. *Rail crash.* Especially where the railway line crosses the road. Due to carelessness, poor eyesight or color blindness, lack of warning signals.
2. *Air crash.* Particularly at international airports or remote airstrips.
3. *Road crashes.* On the increase: travel increases as road conditions improve.
4. *Fires.* Often due to the practice of burning land; too hot oil and/or matches in the home.
5. *Industrial explosions/landslides.* Often due to the lack of observation and enforcement of safety regulations.

6. *Earthquakes*. Have been known to occur in Africa in certain regions.
7. *Volcanic eruptions*. As recently as early 1977, active volcanic movement occurred at Goma in east Zaïre, causing people to abandon their homes.
8. *Tropical storm/floods*. Devastation due to high winds and excessive rain.
9. *At sea*. Applies only to coastal areas, where the oil and fishing industries are particularly at risk.
10. *Single-purpose buildings*. Risk of fire, collapse, etc. Greatest disaster factor is panic.
11. *Dams*. Bursting of a dam, causing flooding and devastation, especially if places of habitation are nearby.
12. *Drought/famine*. Require surveillance, reporting, action.
13. *Pandemics/epidemics*. Known diseases: due to lack of knowledge, sanitation, immunization. New diseases: difficult to deal with, but good health care techniques may help reduce the spread of disease.

It is the responsibility of primary health care workers, with their intimate knowledge of the community, to assess the disaster possibilities in the area and to know how they would deal with all aspects of emergency work, such as:

- Knowing when to seek outside disaster relief.
- Planning of rescue operations.
- Prevention of panic.
- Implementation of certain rescue operations.
- Establishing communications with the nearest village or town.
- Estimation of the needs for and amounts of emergency provision of:
  - Food.
  - Shelter.
  - Hygiene.
  - Medical care.
- Raising and maintaining of morale.
- Planning and implementing a return to normalcy.

Preparation. Two of the major responses that a health care faculty should make to a disaster involve:

- Evacuation.
- Expansion of treatment and patient areas for care of casualties.

One of the most important steps in preparing for a disaster is to appoint community leaders, or a committee, to continuously review the area for environmental hazards, to establish a course of action based on local conditions, and to plan to secure expert help as needed.

Phases of Disaster

- Pretreatment:
  - Occurrence
  - Detection
  - Travel to site with medical services/supplies/first-aid equipment
- Preliminary care phase:
  - On-site problem analysis and emergency treatment
  - On-site treatment: triage, patient information
  - Facility medical-services preparation
- Definite care phase:
  - Definite treatment and diagnosis
  - Recuperation and rehabilitation

Learning Strategies

1. *Outline a 50-km radius on a map from the training center or dispensary and discuss all the disasters which might occur in that area and the methods of preventing them. Identify methods of preparing for those potential disasters and plan a rescue operation in the event of a major natural or man-made disaster.*
2. *Suggest various methods for control and surveillance of an epidemic.*

7
HEALTH DATA

In order to identify and respond to the health needs of the community, the primary health care worker should be able to view these from a broad perspective. The collection, analysis, and interpretation of health data provide such a perspective.

In this chapter, the instructional content includes class exercises which apply and test the student's understanding of the material. No separate learning strategies are presented, and the instructor should devise additional exercises as needed.

Instructional Content for Statistics

Demographic and health statistics are important for the planning and administration of health services. The primary health care worker is interested not only in the extremes of human life, or birth and death, but also in events occurring throughout a person's life-span, such as disease, disability, or any health actions undertaken to promote well-being.

To estimate the health status of a population, life events should be expressed in figures. This numerical representation of facts or events constitutes statistics. Tools and techniques used in statistics include:

- Scientific notation.
- Rates such as mortality rate, prevalence rate.
- The arithmetic mean, the mode, and the range of a set of data.
- Statistical tables.
- Graphs such as bar diagrams, curve diagrams, and others.

1. Scientific Notation

a. *Powers*

1) $3^4 = 3 \times 3 \times 3 \times 3 = 81$

The exponent 4 indicates the number of times 3 is multiplied by itself.

3^4 reads: 3 to the fourth power.

2) $2^7 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 = 128$

In 2^7, 7 indicates the *number of factors*, but 7 is not a *factor*.

Never express 2^7 by 2×7.

3) $6^1 = 6$. The first power of a number equals that number.

4) $10^0 = 1$. The zero power of any number equals 1.

b. *How to Convert Large Numbers into Scientific Notation*

1) Express 378,000,000 in scientific notation.

3.78 000000	Place a decimal point in order to have a number between 1 and 10.
3.78000000	Count the number of digits to the right of the decimal point.
10^8	The number of digits is the exponent of 10.
$378,000,000 = 3.78 \times 10^8$	Write the number under the form of a product by the power of 10.

2) Light travels 9,390,000,000,000 kilometers during one year (365 days). Express in scientific notation.

9.390000000000

$9,390,000,000,000 = 9.39 \times 10^{12}$

3) The number of red cells in the body reaches approximately 25,000,000,000,000. Express in scientific notation.

2.5000000000000

$25,000,000,000,000 = 2.5 \times 10^{13}$

4) In 1975, the world population was 3,967,000,000. Express in scientific notation.

$3,967,000,000 = 3.967 \times 10^{9}$

c. *How to Convert Very Small Numbers (between 0 and 1) into Scientific Notation*

1) Express 0.000000542 in scientific notation.

$0.000000\boxed{5.42}$ — Place a decimal point in order to have a number between 1 and 10.

$0.0000005.42$ — Count the *number* of digits to the left of the new decimal point.

10^{-7} — The exponent will be negative because the number of digits has been counted to the left of the new decimal point.

$0.000000542 = 5.42 \times 10^{-7}$

Write the number as the product of 5.42 by the negative power of 10.

Scientific notation carrying positive exponents expresses very large numbers while negative exponents are used for very small numbers (between 0 and 1).

2) The diameter of a polynuclear white blood cell measures 12 u, that is, 0.000012 m. Express in scientific notation.

$0.\underline{00001}.2 \qquad 0.000012 = 1.2 \times 10^{-5}$

3) The length of a nylon molecule measures 0.000000213 cm. Express in scientific notation.

$$0.000000213 = 2.13 \times 10^{-7}$$

d. *Scientific Notation into Standard Notation*

Note: Always add the zeros necessary to complete the displacement.

1) $3.17 \times 10^{3} = 3,170$

To multiply by a positive power of 10, move the decimal point to the right the number of places corresponding to the exponent. Here, the decimal point was moved three places to the *right*.

2) $0.0000342 \times 10^{4} = 0.342$

Move the decimal point four places to the right.

3) $43.82 \times 10^{-3} = 0.04382$

To multiply by a negative power of 10, move the decimal point to the left as many places as indicated by the exponent. Here, it was moved three places to the *left*.

4) $5,083 \times 10^{-6} = 0.005083$

Move the decimal point six places to the left.

The conversion of scientific notation into standard notation is nothing but a multiplication by a power of 10 as demonstrated above.

5) The velocity of light is approximately 2.9886×10^{8} meters per second. Express in standard notation.

$2.9886 \times 10^{8} = 298,860,000$

Add enough zeros to complete the displacement.

6) One cubic centimeter of air contains approximately 2.7×10^{19} molecules. Express in standard notation.

$2.7 \times 10^{19} = 27,000,000,000,000,000,000$

7) The radius of a proton measures 1.03×10^{-16}. Express in standard notation.

$1.03 \times 10^{-16} = 0.000000000000000103$

2. Rates

a. Remember that *a rate is a ratio* indicating a comparison between two numbers. A ratio can be expressed by using the fraction symbol.

Example: The ratio of white cells relative to red cells is 1:600 or $\frac{1}{600}$, meaning that for each white cell, there are 600 red ones.

White cells $\frac{1}{600}$
Red cells

b. *Rates (per 1,000)*: Often in health statistics, we express rate per 1,000.

1) The rate (per 1,000) of stillborn is the number of stillborn per each 1,000 births. It can be written as:

$$\frac{\text{Stillborn}}{\text{1,000 births}}$$

Example: The rate (per 1,000) of stillborn in locality X was 41.

Stillborn ⟶ 41
Births ⟶ 1,000

> Note: The stillborn were included in the 1,000 births; therefore, there were 959 babies born alive.

2) Note that if we express a rate (per 1,000), this does not mean that there were exactly 1,000 births in a locality.

Example: In a village during one year, there were 2 stillborn among 50 births. To calculate the rate of stillborn per 1,000, we apply the following proportions:

Stillborn ⟶ $\frac{2}{50} = \frac{x}{1{,}000}$ $\quad x = \frac{(2)(1{,}000)}{50} = 40$
Births ⟶

The rate is 40 per 1,000.

3) Why do we use the rate per 1,000? Like the percentage, it is an effective method of comparison.

Example: In locality A, there had been during the same year 2 stillborn among 40 births, and in locality B, 5 stillborn among 125 births. Compare the two using the rate per 1,000.

A	B
$\frac{2}{40} = \frac{x}{1,000}$	$\frac{5}{125} = \frac{x}{1,000}$
$x = 50$	$x = 40$
Rate for A is 50 per 1,000.	Rate for B is 40 per 1,000.

c. *Rate of Neonatal Deaths:* This rate expresses the number of infant deaths between 0-28 days per 1,000 live births in which the deaths were observed.

1) In a locality, the neonatal mortality rate was 78 per 1,000.

Deaths between 0-28 days ——————→ 78
Live births ——————→ 1,000

2) Sometimes we express the rate per 1,000 as ‰.

Example: $\frac{78}{1,000} = 78$ ‰.

d. *Infant Mortality Rate per 1,000:* This rate expresses the number of infant deaths per 1,000 live births during a year.

1) In a locality, the infant mortality rate was 295 per 1,000.

$$\frac{\text{Number of deaths of infants aged less than 1 year} \longrightarrow 295}{\text{Number of live births} \longrightarrow 1{,}000}$$

Note that the infant mortality rate includes also the number of neonatal deaths (0-28 days).

2) What are the causes of infant mortality? The following table gives the most important causes of infant mortality in a rural area in Africa.

Causes of Death	Total Number of Deaths in Percentage
a) Diarrhea	12
b) Pneumonia	12
c) Malnutrition	12
d) Malaria	8
e) Whooping cough	8
f) Measles	8
g) Tuberculosis	5
h) Smallpox	5
i) Various conditions	30

Look at the table. The meaning of 12% for diarrhea is:

$$\frac{\text{Deaths caused by diarrhea} \longrightarrow 12}{\text{Deaths under 1 year of age} \longrightarrow 100}$$

The base 100 indicates the total number of deaths within which the deaths caused by diarrhea occurred. The meaning is the same for the other causes. This is called disease-specific mortality rate.

3) In a locality, the infant mortality rate is 278 per 1,000; 12% are caused by malnutrition. Calculate the number of deaths per 1,000 caused by malnutrition. (Round off to the unit.)

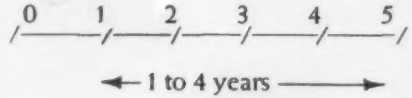
278 per 1,000

12% caused by malnutrition.

$$\text{Malnutrition} \longrightarrow \frac{12}{100} = \frac{x}{278} = \frac{278 \times 12}{100} = 33$$
$$\text{Deaths} \longrightarrow$$

Answer: 33 deaths by malnutrition per 1,000 live births.

e. *Mortality Rate for Children Aged 1 to 4 Years:* This rate expresses the number of deaths among children from 1 to 4 years of age, per each group of 1,000 children within the same age group. One to 4 means starting the day of the first anniversary and ending the last day of the fourth year or the day before the fifth anniversary.



1) In locality X, the mortality rate for children aged 1 to 4 was 69:

$$\text{Number of deaths (1-4)} \longrightarrow \frac{69}{\text{Among number of children (1-4)} \longrightarrow 1,000}$$

f. *Mortality Rate per 1,000:* This rate expresses the number of deaths during a specific time (usually a year) among each group of 1,000 inhabitants during the same period.

1) In a locality X, the estimated mortality rate is 20 per 1,000.

$$\text{Deaths} \longrightarrow \frac{20}{\text{Inhabitants} \longrightarrow 1{,}000}$$

That is, 20 out of each 1,000 inhabitants died during a specific period of time.

g. *Natality Rate per 1,000*: This rate expresses the number of births within each group of 1,000 inhabitants.

1) In 1977, the natality rate in country X was estimated at 47 per 1,000.

$$\text{Births} \longrightarrow \frac{47}{\text{Inhabitants} \longrightarrow 1{,}000}$$

2) If we accept the natality rate as 47 per 1,000 and the mortality rate as 20 per 1,000:

a) Calculate the increase in percent.

b) Calculate the population increase in 1976 if the population in 1975 was 24,842,051.

Answer: Births − Deaths = Increase

$$47 - 20 = 27 \text{ (per 1,000)}$$

$$\frac{27}{1{,}000} = \frac{x}{100} \qquad \frac{27 \times 100}{1{,}000} = 2.7\%$$

i) 2.7% increase.
2.7% of 24,842,051
0.027 × 24,842,051 = 670,735 (rounded off to the nearest unit)

ii) During one year, the increase in population was approximately 670,735.

h. *Prevalence Rate:* This rate expresses the total number of cases of a disease at a designated time for a specified population.

1) In a village of 3,450 inhabitants, 79 cases of tuberculosis were diagnosed. Calculate the prevalence rate per 1,000. (Round off to the tenth.)

$$\frac{79}{3,450} = \frac{x}{1,000} \qquad x = \frac{79 \times 1,000}{3,450} = 22.9$$

i. *Incidence Rate:* This rate expresses the total number of cases of a disease or infection which comes into being during a specified period of time per specified unit of population. The incidence rate per 1,000 is the number of new cases per 1,000 inhabitants during a definite period of time.

1) In 1969, in seven African countries, with a total population of 38,141,581, the total number of cases of measles was estimated at 131,581. Calculate the incidence rate per 1,000. (Round off to the tenth.)

Answer: $\frac{131,581}{38,141,000} = \frac{x}{1,000}$

$$x = \frac{131,581 \times 1,000}{38,141,000} = \frac{131,581}{34,141} = 3.8$$

The incidence rate per 1,000 was 3.8.

Note:

a) The prevalence rate is easier to measure than the incidence rate. It is used to gather information concerning the im-

portance of a disease or an infection at a specified time. The incidence rate is more difficult to measure, but it is used more often to compare different populations. Also, because the period of time is longer, the incidence variations can be studied and hopefully the cause may be determined.

b) Although the rate per 1,000 is used more often, sometimes for convenience or convention rates per 10,000 or per 100,000 are needed.

c) In conclusion, when rates are examined, one should keep in mind that the numerator is included in the denominator.

Example: Prevalence rate (Tuberculosis) $= \frac{18 \text{ TB cases}}{1{,}000 \text{ Inhabitants}}$

This means that among the 1,000 inhabitants, there are 18 who are tubercular and 982 who are nontubercular.

3. Calculation of Certain Values in Statistics

a. *Arithmetic Mean*: It is used to measure the central tendency of a list of given quantities.

$$\text{Mean} = \frac{\text{Sum of quantities}}{\text{Number of quantities}}$$

1) Calculate the mean of the following heights:

180 cm, 183 cm, 176 cm, 193 cm, 163 cm, 188 cm.

$$\text{Mean} = \frac{180 + 183 + 176 + 193 + 163 + 188}{6}$$

$$= \frac{1,083}{6} = 180.5 \text{ cm}$$

b. *The Median:* The median also measures the central tendency in a set of data. To calculate the median, rearrange the data from the smallest numbers to the largest, then choose the middle one if the number of data is odd or the arithmetic mean of the two middle numbers in the array when the number of data is even.

1) The ages of a group of boys:

16, 10, 13, 11, 15, 14, 8, 11, 10, 12, 16

Rearrange:

8, 10, 10, 11, 11, 12, 13, 14, 15, 16, 16

12 in the middle is the *median*.

2) 9, 8, 10, 12, 13, 16, 15, 12, 11, 8, 9, 12

Rearrange:

8, 8, 9, 9, 10, 11, 12, 12, 12, 13, 15, 16

11, 12 are the middle data.

The arithmetic mean is: $\frac{11 + 12}{2} = \frac{23}{2} = 11.5$

c. *The Mode:* The mode, another way to express a central tendency, is the number occurring most often in a set of data. Often, there is no such number; consequently, there is no mode.

1) Find the mode of the following weights (kg):

3.5	7.2	6.0	5.1	7.3	5.1
2.4	5.1	6.2	8.9	5.1	6.3

The mode is 5.1; its frequency being 4, which is the number occurring most often.

d. *The Range*: The range is the difference between the largest and the smallest number in a set of data. It is an index of dispersion.

1) Table of heights comparison (cm).

Team A: 163 168 168 171 180 170 168
Team B: 153 159 167 177 194 170 167

Although the two teams have the same average and nearly identical medians, the heights differ. It is because the ranges are very different.

Range (A) = 180 − 163 = 17 cm
Range (B) = 194 − 153 = 41 cm

4. Statistical Tables

In this part, the students will be acquainted with a new glossary. They will use the tables to answer questions. The statistical tables are summaries of health surveys.

a. *Frequency Distribution*

1) Cases of cholera in some African countries in 1971.

CLASSES	FREQUENCIES	
Country	Cases of Cholera	
Niger	9,255	Statistical Units
Ghana	13,057	
Nigeria	21,351	
Togo	335	
Uganda	757	
Senegal	275	
Kenya	301	
	45,331 = Total Population	

The table has two columns. To the left are the *classes* (different countries) and to the right the *frequencies* (the number of statistical units). The frequency in Senegal is 275. The sum of frequencies is the *total population*.

2) Reported cases of measles in Africa from 1965 to 1969.

Year	Reported Cases of Measles
1965	497,819
1966	559,212
1967	540,556
1968	412,485
1969	524,095

a) What is the statistical unit?—Reported cases of measles.
b) What are the classes?—1965, 1966, 1967, 1968, 1969.

c) What is the frequency in 1968?—412,485.
d) What year had the largest number of cases?—1966.

3) Diphtheria in England in 1960.

Age (in years)	Deaths
0-4	49,479
5-9	23,348
10-14	4,092
15-19	1,123
20-24	585
	78,627

Note: The years are completed; for example, 5-9 years of age means from the day of the fifth anniversary to the last day before the ninth anniversary. The *interval* of each class is five years. What age group has the largest number of deaths?—0-4

It appears that the younger the child, the greater the risk of death. The following table shows the deaths between 0-4 years.

Age (in years)	Deaths
0	4,186
1	10,491
2	11,218
3	12,390
4	11,194
	49,479

During the first year, there are fewer deaths than among the other groups shown above. This implies a maternal immunity

which can be verified by the finding of antibodies in the child.

4) A frequency distribution of white cell count.

White Cell Count (per mm^3)	No. of Male Adults
2,000-3,999	7
4,000-5,999	24
6,000-7,999	22
8,000-9,999	16
10,000-11,999	12
12,000-13,999	5
14,000-15,999	1
16,000-17,999	2
	89

The interval between each class is 2,000.

Example: 9,999-8,000 + 1 = 2,000
To find the interval, subtract, then add one unit.

b. *Table for Group Frequency Distribution*

1) Mortality caused by acute diarrhea in India.

Age in Months	Rate per 1,000 of Annual Mortality Caused by Diarrhea
0-5	20.6
6-11	53.6
12-17	34.8
18-23	7.4

a) What age interval has the highest rate?—6-11 months
b) Write the rate as a ratio:

$$\frac{53.6 \longrightarrow \text{Deaths by diarrhea}}{1{,}000 \longrightarrow \text{Children (6-11 months)}}$$

c) Explain why this age group has the highest death rate.

Because it occurs during the dangerous period of weaning.

c. *Tables in Nutrition*

1) The quantity of proteins (in grams) contained in 100 g of the comestible parts.

Foods from Animal Origin	Proteins (in g) in 100 g
Dry fish	63
Caterpillar	55
Lake flies	49
Powdered skim milk	26
Corned beef	23
Liver giblets	20
Sardines in oil	20
Fresh beef	16

Daily Protein Requirements per Kg of Weight	
Adult	1 g
Pregnant woman	1.5 g
Breast-feeding woman	2.5 g
Child	3 g
Infant	3 g

Which food of animal origin contains the largest amount of proteins for each comestible part?—Dry fish, with 63 g.

2) For each kg of weight, a child needs 3 g of proteins, but an adult needs only 1 g. Does it mean that a child needs more daily proteins than an adult? Demonstrate by an example.

A child weighing 15 kg needs 15 × 3 = 45 g daily, while an adult weighing 60 kg needs 60 × 1 = 60 g. The answer is no. A child in this instance does not need more daily protein than an adult.

3) A child weighing 15 kg needs 45 g of proteins daily. A glass of milk is obtained by mixing 30 g of powdered milk with water. How many glasses of milk will the child need to drink to meet the daily requirements (100 g of powdered milk = 26 g of proteins)?

Proteins ——→ $\frac{26}{100} = \frac{x}{30}$
Milk ——→

1 glass of milk provides 7.8 g of proteins. How many glasses provide 45 g?

$45 \div 7.8 = 5.8$ (rounded off to the tenth)

The child will need nearly six glasses of milk.

d. *Table of Dosage*

1) The dosage of oral chloroquine used for children for a *curative* treatment.

Age	1st Day	2nd Day	3rd Day
Less than 1 year	100 mg	75 mg	50 mg
1-4 years	200 mg	150 mg	75 mg
4-6 years	300 mg	150 mg	100 mg
6-12 years	400 mg	200 mg	200 mg
12 years and over	600 mg	400 mg	300 mg

2) A hospital has 100-mg. chloroquine tablets.

How many chloroquine tablets do we need to administer to a child from 4 to 6 years of age on the first day? Second day? Third day?—3 tablets the

first day; 1 1/2 tablets the second day; 1 tablet the third day.

3) How many tablets do we need to give a child aged less than 1 year on the second day? On the third day?—3/4 tablet on the second day; 1/2 tablet on the third day.

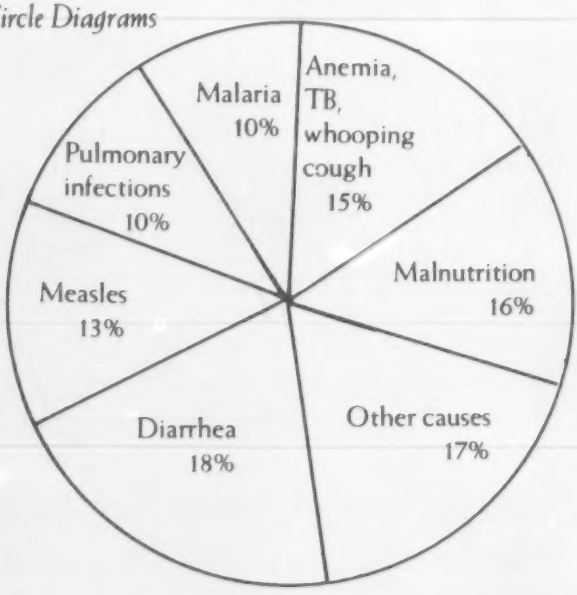
To determine the number of tablets, divide by 100.

For 75 mg: $\frac{75}{100} = \frac{3}{4}$; therefore, $\frac{3}{4}$ of a tablet.

5. Graphic Representation of Numerical Data

Tables give a résumé of statistics or numerical data. Tables are summaries of surveys. They can be expressed by a graph. Many kinds of graphs exist.

a. *Circle Diagrams*



Major Causes of Death Among the Under-5's in Zambia (1970)

Note that all the causes form a whole (100%) and that each cause expressed in percent forms a part. The circular diagrams are easy to read. (Due to rounding, the above does not add up to 100%.)

1) What is the major cause of death?—Diarrhea. Note that the sector in the circle is also the largest.

2) What is the second largest cause?—Malnutrition.

Be careful when you combine causes. The combination of whooping cough, tuberculosis, and anemia reaches 15%, a percent greater than measles, which is 13%.

b. *Vertical Bar Diagrams*

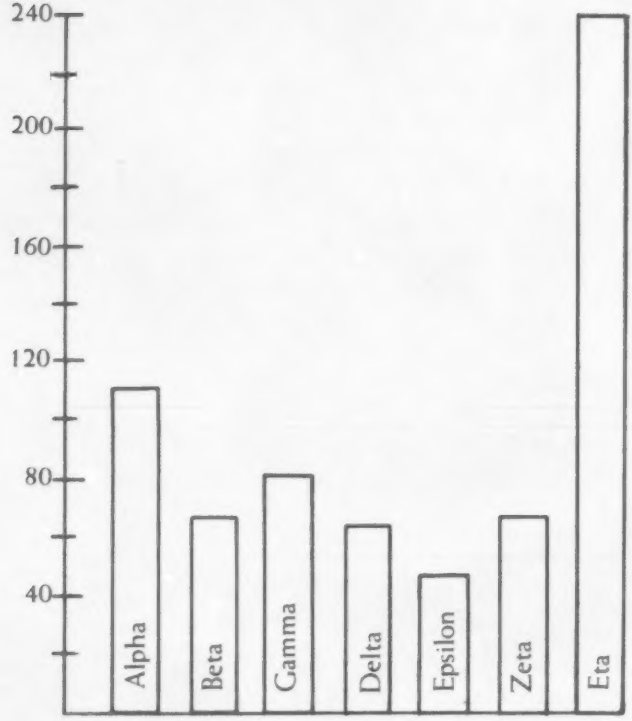
These diagrams are used to compare quantities such as weights, heights, rates, frequencies, etc.

Stars	Light-Years
Alpha	109
Beta	76
Gamma	79
Delta	74
Epsilon	72
Zeta	76
Eta	251

Note that on the vertical axis all units are equally spaced. Their positions are compared with the heights of the bars on the horizontal axis. On the following diagram, what is the

interval between the units on the vertical axis? The interval is 20 (light-years). Between 80 and 40, there are two intervals, therefore:

$$\text{Interval} = \frac{80 - 40}{2} = 20$$

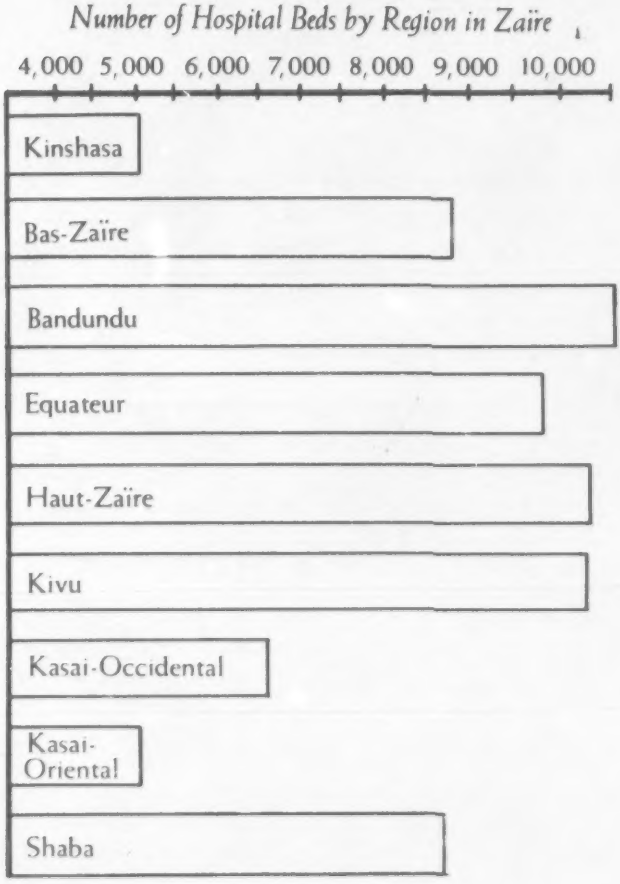


1) Which star is farthest?—Eta.
2) Which stars are approximately the same distances from the earth?—Beta, Gamma, Delta, Epsilon, Zeta.
3) Looking only at the diagram, can we read the distances exactly? No; the diagrams generally do not give the exact measures but rather make comparisons.

4) Can we choose 10 (light-years) for each vertical unit?—Yes, but there would be 24 units in all, and this would make the diagram very tall.
5) Can we choose 40 as the unit?—Yes, but the diagram would be less precise.

c. *Horizontal Bar Diagrams*

These diagrams are also used for comparison.



In a horizontal bar diagram, all the bars on the vertical axis are equal, but their lengths are *compared on the horizontal axis.*

1) What is the horizontal unit?—

$$\frac{6,000 - 5,000}{2} = 500$$

2) What region has the most beds?—Bandundu.
3) Name two regions which have approximately the same number of beds.—Bas-Zaïre and Shaba; Haut-Zaïre and Kivu.
4) What number marks the beginning of the axis and why?—The axis begins at 3,500 because there are no regions with fewer than 3,500 beds.
5) Can we say exactly how many beds there are per region?—No; the horizontal bar diagrams do not give precise numbers but are useful for comparison.

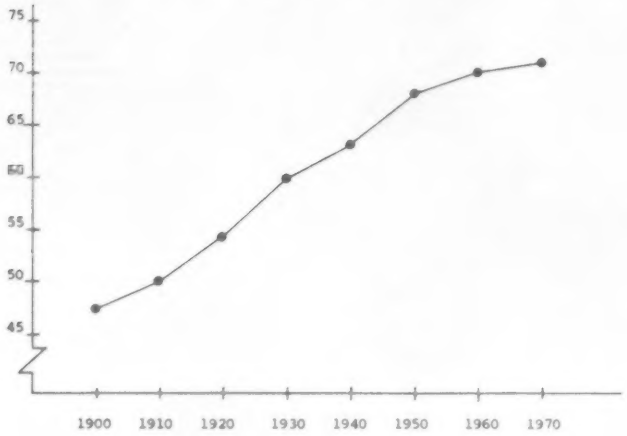
d. *Curve Diagrams: Frequency Polygon*

These curves are used to demonstrate trends, rising or decreasing trends.

The average life-span in the United States:

Year	Average Life-Span (in years)
1900	47.3
1910	50.0
1920	54.1
1930	59.7
1940	62.9
1950	68.2
1960	69.7
1970	70.9

In the diagram below, there are units on both axes because we have two measures. The broken line on the vertical axis simply means the scale does not start at zero.



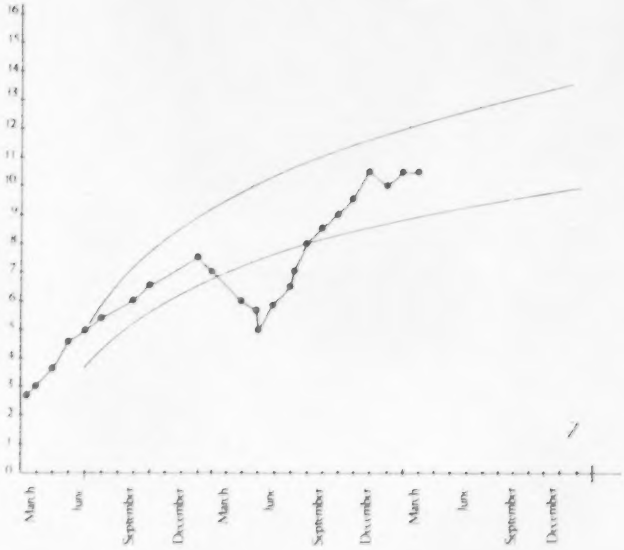
1) What is the horizontal unit?—10
2) What is the vertical unit?—5

A rise is the trend shown here. This rise was brought about by the progress made in medicine through the years, thus allowing an increase in life-span.

Let us interpret the weight curve of a child. First, on the diagram on page 96, examine the two reference curves (the parabolas), designed by Dr. David Morley, from England. Other curves have been designed and could be used, but the ones proposed by Dr. Morley are simpler and more practical. The most important factor to keep in mind is the *relative growth* of a child, and the main objective of care should be to maintain an adequate rate of growth. Too often, discussions

are raised about the choice of curves while the attention should be given to the direction of the curve. In general, the growth curve should be above the inferior reference curve and proceed parallel with both reference curves.

Weight Curve of a Child

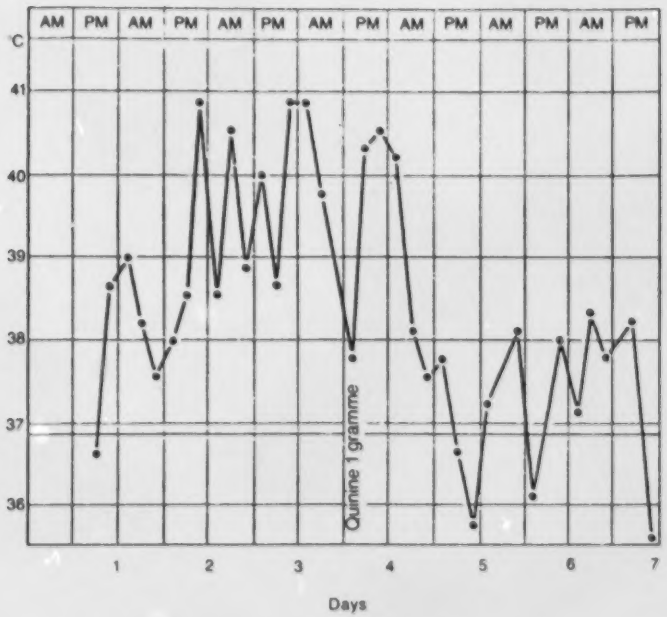


On this diagram, the case history of an African child exemplifies the previous discussion. Notice the sudden drop in the dotted line (January to May), and then the gradual increase in weight (May to December). Factors such as measles, diarrhea, and malnutrition can contribute to the dropping of the curve, while treatment of illnesses and nutritional treatment may bring about increases. Finally, notice the curve from January to March at the end of the chart. The diagnos-

tician should take note. Although the weight of the child is now above the inferior curve, it is most important to see if the child's weight is progressing adequately. In this period (toward the end of the graph), some more information—the weights of the following months—will be needed.

For easy reference, weigh the child each month and indicate the reading in the column designed for this purpose; circle the month of birth. Weighing without drawing a curve serves no purpose as you cannot see the trend.

A Primary Aborted Attack of P. falciparum *Malaria*



This graph shows clearly the increases and decreases of a patient's temperature during

an attack of *P. falciparum* malaria. What was the temperature at the third reading on the afternoon of the fourth day?
—(40.5 C.)
The graph shows that a dose of quinine will cause the temperature to rise. Comment.

PART III

The Health of the Individual

Introduction

The chapters in this part serve as a guide in training the primary care worker to assess the health status of individuals, to recognize diseases, and to develop and implement appropriate plans of care. The training should emphasize that the patient is an individual, and not just another case of this disease or that condition. The patient is understood in terms of his/her family, community, and responsibilities. These chapters, therefore, relate to the local environment and the disease patterns of the area.

The role of the primary care worker in managing the diseases of individuals goes beyond providing curative measures to persons who actually ask for help. The role includes the ability to identify members of the community who are in need of preventive health care and to provide, or arrange for other workers to provide, such care.

The material in this part of the handbook is organized into four comprehensive chapters: The Health of the Mother, The Health of the Child, The Health of the Adult, and Health-Related Sciences.

8
THE HEALTH OF THE MOTHER

This chapter studies the care of the normal, pregnant woman and newborn and the recognition and care of the abnormal pregnancy and newborn. On completion of this section, the primary care worker will be able to monitor the health of the mother during pregnancy, delivery, and lactation, and, in addition, will be able to protect the health of the newborn.

Unlike the chapters on the health of the child and of the adult, which follow, the discussion of the health of the mother does not differentiate between conditions or activities on the basis of expertise. Much of the work of primary health care workers is concerned with maternal and newborn care, and it is important that they have a comprehensive understanding of all aspects of this care. Further, in most communities, it is unlikely that women who have complicated pregnancies will be able to be referred to a physician or hospital for care on a regular basis, and so the primary health care worker should be able to assume responsibility for these women.

The chapter is divided into five sections, and learning strategies are presented immediately following the instructional content of each section. The sections are: obstetrical physiology, normal pregnancy, high-risk pregnancy, the newborn, and abnormalities and diseases of the newborn.

Instructional Content for Obstetrical Physiology

Obstetrical physiology includes a review of anatomy-physiology and a comprehensive look at pregnancy, the parturition period, labor and delivery, and the postpartum period.

Anatomy-physiology includes:

- Adolescence and puberty in girls and boys.
- The female pelvis.
- The female and male reproductive organs.
- The menstrual cycle.
- The methods of fertility control.

Learning Strategies for Obstetrical Physiology

1. *Describe the anatomical structures and the physiology of the reproductive organs of the male and the female.*
2. *Measure the pelvis of a pregnant woman.*
3. *Have each female student calculate her menstrual cycle to determine her fertility and sterility periods.*
4. *Draw the journey of the spermatozoon and the ovum, their meeting place, and the site of implantation.*

Instructional Content for Normal Pregnancy

At the end of this aspect of the chapter on the mother, the primary care worker will be able to assist the woman to maintain the health of herself and her child during pregnancy, delivery, and lactation.

Pregnancy includes:

- Diagnosis of pregnancy: probable signs, presumptive signs and symptoms, positive signs and pregnancy tests.
- Fertilization, migration, and implantation.
- Sex determination and heredity.
- Development of embryo and fetus to full term.
- The placenta and its membranes.
- Maternal physiologic changes.
- Gemellary pregnancy.
- Minor discomforts during pregnancy, including: Backache, fatigue, and vaginal discharge.

Gastrointestinal disorders: heartburn, nausea, vomiting, and constipation.

Pressure symptoms: hemorrhoids, cramps, shortness of breath, varicose veins, and urinary frequency.

Period of parturition includes:

- The bony pelvis.
- Fetomaternal anatomical relationship.
- Presentations and their categories.
- The position of the fetus.
- Engagement.
- Diagnosis of presentation and positions.

Labor and delivery includes:

- The three stages of labor:
  - Dilation: contraction, dilation, cervical effacement, rupture of the membranes
  - Expulsion: engagement, descent, flexion, internal and external rotation, breech delivery, the delivery of twins
  - Placental state: separation and expulsion

Postpartum period includes:

- Involution of the uterus and lochial discharge.
- The afterpains.
- Obstruction of the mammary glands.
- Hygiene: perineum, care of the breasts, nutrition, suitable rest, sexual intercourse.
- Postpartal disorders such as urinary retention and constipation.

Learning Strategies for Normal Pregnancy

1. *Study and discuss the local methods of fertility control.*
2. *Draw, in a group, the actual size of the developing fetus and utilize this group effort for future teaching materials.*

3. Draw fetal circulation graphically.
4. Establish a prenatal record for one mother.
5. Perform a physical examination on a pregnant woman. Inspect for general signs and symptoms, palpate the abdomen, examine height of the fundus and the fetal heartbeat. Estimate the age of the fetus and the probable date of delivery.
6. Take histories of several pregnancies.
7. Prepare a lecture on one of the following:
   - Sexual education for adolescents
   - Premarital education
   - Hygiene during pregnancy
   - Preparation for delivery
   - Care of the baby
8. Diagnose and evaluate a patient by taking her history, giving a physical examination, and performing relevant laboratory tests.
9. Review the diameters of the pelvis and the fetal head.
10. Through abdominal palpation, determine position, presentation, and engagement.
11. Listen to a fetal heartbeat. What are your observations?
12. Prepare admission records describing a pregnant patient's medical history and the onset of labor.
13. Observe the progress of labor by examining the frequency, strength, and duration of contractions; conducting a vaginal examination to determine dilation, effacement, presentation, and fetal heartbeat.
14. Observe the condition of the laboring mother. Prepare the labor room and appropriate equipment.
15. Determine membrane rupture in a patient.
16. Inspect and describe, in writing, the placenta.
17. Observe at least 10 parturients from arrival to delivery. Take comparative notes.
18. Keep general surveillance during the period of parturition.

19. *Take care to use clean technique when expressing milk from breasts manually or with pump.*
20. *Catheterize a patient.*
21. *Consult postnatal persons and take histories, examine them physically, and educate the mother.*
22. *Describe the major developmental stages of the embryo and the fetus.*
23. *Diagnose a pregnancy as early as three months on the basis of clinical signs and follow the development of the pregnancy.*
24. *Assist a parturient woman during a normal delivery and administer postpartum care.*
25. *Give health care to a newborn.*
26. *Identify the signs of complications during pregnancy, labor, delivery, and the postpartum period and take appropriate measures.*
27. *Give health education to the mother concerning her well-being and that of her baby.*

Instructional Content for High-Risk Pregnancy

This aspect of the chapter on the mother includes disabling conditions preexistent to the pregnancy, obstetrical complications and operations, and labor and postpartum complications.

Disabling conditions include:

- Anemia.
- Respiratory infections such as TB.
- Cardiovascular disorders such as hypertension.
- Renal conditions.
- Diabetes.
- Acute infectious diseases, rubella, influenza, hepatitis.
- Venereal diseases.
- Parasites that cause malaria, trypanosomiasis, worms.

Obstetrical complications include:

- Pernicious vomiting.
- Ectopic pregnancy.
- Premature terminations of pregnancy, e.g., the various types of abortions, septic abortions, induced abortions, premature delivery.
- Hydatidiform mole.
- Antepartum hemorrhage: placenta previa and abruptio placentae.
- Toxemias of pregnancy, such as mild and severe preeclampsia and eclampsia.
- Hydramnios.
- Fetal death.

Obstetric operations include:

- Ventouse.
- Forceps.
- Symphysiotomy.
- Cesarean section.
- Version.
- Prenatal and postnatal operative care.

Labor complications include:

- Dystocias: pelvic contraction, excessive size of fetus, fetal malformation, transverse, occiput, or posterior positions, breech and face presentation.
- Dystocias: prolonged or arrested labor and hypertonic uterus.
- Ruptured uterus.
- Inversion and prolapsus of the uterus.
- Lacerations.

Postpartum complications include:

- Postpartum hemorrhage: lacerations, retained placental tissue, uterine atony, and clotting disorders.

- Puerperal infections.
- Mastitis or abscess.
- Fistulas.
- Tetanus.

Learning Strategies for High-Risk Pregnancy

1. *Perform a physical examination to determine position of fetus, heartbeat, and vital signs.*
2. *Describe the emergency preparations for surgery.*
3. *Learn general and specific nursing care treatments.*

Instructional Content for the Newborn

This part of the chapter includes a study of physiology and the neonatal period or the period covering 10 days from birth.

Physiology includes:

- The rhythm, movements, and rate of respiration, the cry.
- The skin, hair, and nails of the newborn: vernix caseosa, lanugo hair, turgor or muscle tone, physiologic jaundice.
- The head and neck of the newborn: molding, fontanelles, circumference.
- The face: mouth, eyes, ears.
- The thorax to abdomen, including respiratory movements, cardiac rhythm, and breast engorgement.
- The genitourinary and anus.
- The nervous system, including Moro's reflex, the grasp reflex of the hands and feet, the stepping and crawling movements, the rooting, sucking, swallowing, and gagging reflexes.
- The general newborn characteristics, includ-

ing weight, length, head, and thorax circumferences, temperature, meconium, and urine.

Neonatal period includes:

- Immediate assessment of the newborn (Apgar).
- Care of the newborn.
- Giving BCG and smallpox vaccine immunizations.

Learning Strategies for the Newborn

1. *Palpate the head and collarbones.*
2. *Inspect the palate, eyeballs, neck flexion, and ears.*
3. *Learn preventive treatment of ophthalmia neonatorum.*
4. *Care for the umbilical cord.*
5. *Inspect the vulva, penis, scrotum, and anal opening.*
6. *Determine the mobility and position of limbs, e.g., abduction of hip.*
7. *Take measurements of the newborn.*
8. *Make general observations of physical characteristics.*
9. *Take general care of the newborn with baths, measurements, thorough care of the umbilical cord, and vaccinations.*
10. *Prepare a road-to-health chart.*
11. *Give health education to the mother.*

Instructional Content for Abnormalities and Diseases of the Newborn

This aspect of the chapter details the abnormalities and diseases of the newborn which the primary health care worker should recognize.

Abnormalities include:

- The premature baby:
  Weight, length, and gestational age

Respiration and cry
Skin, nails, lanugo, vernix caseosa
Head, hair, eyes, ears, tongue
Circumferences of the head and thorax
Genital organs
Activity and muscle tone
Gagging and swallowing
Sucking reflexes

- The postmature and low-birth-weight baby:
  - Skin, lanugo, vernix caseosa, desquamation, wrinkles
  - Subcutaneous fat
  - Nails and hair
  - Weight and length
  - Reflexes and attitude
- Birth injuries:
  - Intracranial, i.e., hematoma, fracture of the skull, hemorrhage, and hypoxia
  - Facial nerve injuries
  - Brachial palsy
- Congenital malformations:
  - Anencephalia
  - Microcephalia
  - Hydrocephalia
  - Spina bifida
  - Hare lip
  - Genitourinary
  - Imperforated anus
  - Subluxation of the hip
  - Albinism and Mongolism
- Respiratory distress:
  - Hyaline membrane disease

Diseases include:

- Infection of the umbilicus.
- Hemorrhage of the umbilical cord.
- Diseases and incompatibilities of the blood.
- Neonatal meningitis.

- Neonatal tetanus.
- Venereal diseases such as congenital syphilis and gonococcal blepharitis.
- Thrush.

Learning Strategies for Abnormalities and Diseases of the Newborn

1. *Perform a physical examination. Observe respiratory and heart rhythms, reflexes, and temperature of the newborn. Inspect the head, thorax and abdomen, the skin and muscle tone, and determine weight and length.*
2. *What are the ways of preventing heat loss in newborns? Utilize these methods in a real situation.*
3. *What are the various methods of respiratory stimulation that can be utilized on newborns?*
4. *Feed a newborn with a bottle or a gavage.*
5. *Perform a diagnostic evaluation of a newborn through a physical examination and laboratory tests if necessary.*

9
THE HEALTH OF THE CHILD

Childhood is the time of greatest growth, development, and maturation of the human organism. This period involves a gradual and progressive transition from the total dependency of intrauterine existence to relatively independent function as an adult. Elements of dependency include biologic (food, shelter, protection from various hazards), psychosocial (intellectual and emotional development), and cultural (socialization and education). The family plays a major role during the childhood period, and the primary health care worker should be able to understand the patterns of family structure in order to intervene, as necessary, to promote and maintain the health of the child.

The chapter is organized into four topics. These are: child assessment, developmental appraisal, diseases and disorders, and immunizations.

Instructional content and learning strategies are presented for each of these topics.

Instructional Content for Child Assessment

In order to develop a suitable plan of care, the health of the child must be assessed by taking his/her history, performing a physical examination, determining growth and development progress, and giving tests.

History includes:

- Chief complaint and present illness.
- Past medical history: immunizations, illnesses, development, nutrition, surgery.
- Systems review history.
- Family and social history.

- Prenatal, postpartum, and birth history.
- Interval of well-child history.

Physical examination includes:

- Preparing the child and parent by detailing the steps of the examination.
- Involving the parent as much as possible in the examination.
- Inspection, palpation, auscultation, percussion.
- Obtaining vital signs: pulse, respiration, and temperature.
- Measuring, weighing, and interpreting.
- Plotting and evaluating growth curves on a growth chart.
- Assessing patient's general appearance.

A comprehensive *physical examination* would include:

Head

- Assess distribution, color, and texture of hair.
- Examine shape and nodes of head and scalp.
- Palpate and assess molding and position of cranial sutures.
- Palpate to determine fontanelle size and shape.

Face

- Assess general shape and symmetry of face.

Eyes

- Assess structure: lid, sclera, conjunctiva, pupil distancing, size, extraocular muscles, cornea.
- Assess ocular movements: test for strabismus.
- Assess light reflex, landmarks, colors, and mobility.

Ears

- Examine position, structure, and drainage of external ear.

- Examine size, structure, and patency of external canal.
- Examine drums.

Nose

- Examine shape and patency of nose.
- Examine mucous membrane.

Mouth and Throat

- Examine size, symmetry, color, and texture of lips.
- Examine mouth.
- Examine teeth: dentition stage, malocclusion, position, caries.
- Examine color and general condition of gums.
- Examine color and general condition of buccal mucosa.
- Examine tongue: color, mobility, fissure, and coating.
- Examine palate: hard and soft, shape and size.
- Examine size and shape of uvula.
- Examine posterior pharynx: lymphoidal hyperplasia, color, vesicles, drainage.

Voice

- Evaluate tone, quality, and pitch of voice or cry.

Neck

- Evaluate size, shape, and mobility of neck.
- Palpate size and nodules of thyroid.
- Palpate for nodes.

Chest

- Assess size, shape, and circumference of chest.
- Perform breast examination on adolescent children.

Lungs

- Assess rate, pattern, and type of respiration.
- Percuss chest to assess resonance and organ structures.
- Auscultate chest: breath sounds, rales, rhonchi, extraneous sounds, wheezes.

Cardiac

- Assess general cardiac status: precordial bulging, visible cardiac impulse, cyanosis, edema, clubbing, prominent veins, pulses.
- Palpate for apex of heart, thrills, tenderness.
- Percuss chest to determine heart size.
- Auscultate heart: rate, rhythm, character of heart sounds.
- Describe murmurs: duration, intensity, time character, relation to sounds, transmission.
- Describe other sounds heard: pericardial, cardiopulmonary.

Abdomen

- Inspect for size, shape, visible veins, movements, and structure.
- Percuss abdomen to determine organ size and tympanies.
- Palpate abdomen both superficially and deeply to determine size, shape, mobility of organs/masses, and tenderness.

Male Genitalia

- Examine penis: malformations, discharge, phimosis, ulcerations.
- Examine scrotum and testes: structure and appearance, presence, size, and shape of testes, presence of hydrocele, hernia, or mass.

Female Genitalia

- Inspect size, shape, structure, discharge, and adhesions of external genitalia.

- Inspect vagina: inflammation, discharge, bleeding, foreign body, and structure.
- Examine cervix: shape and consistency, patency, and ulceration.
- Assess size, shape, position, consistency, and mobility of uterus in adolescent children.
- Palpate ovaries and ligaments to determine size, shape, tenderness, and masses, when appropriate.

Anus and Rectum

- Examine buttocks and anus: masses, prolapse, fissure, dimple, protrusions.
- Assess sphincter tone and internal structure of rectum: imperforate anus, fistulas, masses, megacolon.

Extremities

- Examine extremities for anomalies and deformities: presence of parts, extra parts, size, length, shape.
- Assess extremities for presence of any pain or tenderness.
- Evaluate color and temperature of extremities.
- Examine for bone deformities: varus, valgus, tibial torsion.
- Assess gait and stance: balance, toe in, toe out, "scissor gait," limp, ataxia.

Spine

- Inspect for anomalies and masses.
- Evaluate mobility: stiffness, opisthotonos, excess mobility.
- Evaluate posture: scoliosis, kyphosis, lordosis.
- Evaluate position of scapulae.

Joints

- Examine for heat, tenderness, swelling, effusion, redness.

- Evaluate motion of joints and examine hips for congenital dislocation.

Muscles

- Evaluate muscular development, tone, and strength.
- Examine muscles for tenderness, spasm, paralysis, rigidity, atrophy, and contractures.

Learning Strategies for Child Assessment

1. *Evaluate a physical examination and interpret findings.*
2. *Compare the past pediatric history of a child with current findings.*
3. *Consult with parents about their experiences with nutrition, accident or illness prevention, developmental progress of child, behavior management, home care, and treatment for illnesses.*

Instructional Content for Developmental Appraisal

In order to make an accurate appraisal of normal or deviate growth, a knowledge of child development is essential. There are certain principles of growth and defined milestones of organic and functional development. These are listed below.

1. *Principles of normal child development*

Primary care workers should note these principles and use them as guidelines in their assessment of a child's health.

- Growth and development proceed from the cephalocaudal direction, i.e., from the head to the extremities.
- Development proceeds from the general to the specific, e.g., an infant babbles before speaking real words.

- Critical periods occur in child development when new skills appear, e.g., the pincer grasp, walking, and vocalization. The new skill tends to predominate, and the child has a strong drive to practice and perfect the ability, to the neglect of other skills.

2. *Milestones in organic and functional development*

An understanding of these will enable the primary care worker to determine neurological, psychological, or physical disorders.

- 1 month: eyes follow to midline, can lift head slightly from prone position, can regard an object
- 2 months: can smile and coo, can follow a moving object with eyes
- 3 months: can laugh, can hold head up better, can recognize certain objects
- 4 months: can roll from side to side, can grasp objects, has good head control
- 6 months: can sit with minimal support, can roll from supine to prone, can transfer an object from one hand to the other
- 9 months: can sit alone and crawl, can hold two objects simultaneously, can speak simple sounds like "mama"
- 12 months: can stand, may step or walk, develops pincer grasp
- 15 months: can walk without support, can drink from cup, can feed self to an extent
- 18 months: can walk, can run and climb, may use 5 to 10 words
- 24 months: can throw objects, open door, and turn pages; can control daytime bowel and bladder; can parallel play with other children
- 36 months: can feed self, alternates feet when climbing the stairs, uses short sentences

Learning Strategies for Developmental Appraisal

1. *Develop an appropriate toy that will promote functional development of a child of 3, 9, 15, and 36 months.*
2. *Search for a case of a sick child. What might be the cause for its condition? Select topics to teach the parents and siblings how to care for him.*
3. *Prepare a demonstration for mothers of children of different ages. Teach them how to follow the developmental stages, by observing such things as food intake, play activity, toilet training.*

Instructional Content for Diseases and Disorders

This part of the chapter surveys the diseases and disorders that affect the child. In knowing these, the primary care worker will be able to assess the physical health of a child, recognize and treat disorders and diseases within his/her range of competence, and refer children with complicated problems to more specialized personnel. In this last instance, the worker will be able to carry out prescribed treatment, alone or with specialized supervision, and assume responsibility for follow-up care.

The diseases and disorders are organized in sections, according to the part of the body they affect. Within each section, there are three levels which categorize the disease or disorder by the degree of severity and the level of skill and technique required to deal with the problem.

Level 1 includes the conditions most commonly found in tropical and subtropical regions, ones which account for a large percentage of the primary care needs of children. On this level, the plan of care usually can be carried out by the primary care worker alone.

Levels 2 and 3 identify conditions and diseases which may be encountered, but for which the primary care worker generally does not have the experience or technology to diagnose or treat without specialized assistance. Problems

on this level are identified by the primary care worker and then referred to a health care team. On both Levels 2 and 3, prescribed treatment and care can be maintained by the worker, although on Level 3 the follow-up is supervised throughout.

The systems and parts of the body which are dealt with in this part of the discussion of the health of the child include the digestive system, the genitourinary system, the respiratory system, the neurological/musculoskeletal system, the cardiovascular system, the endocrine system, and the skin. This section also details diseases that affect the whole body, as opposed to specific parts or systems, and it includes a list of common, accident-related emergencies so that the primary care worker can be fully prepared.

1. *The digestive system* includes:

   Level 1. Stomatitis; diarrhea caused by bacteria, viral infection, or parasites; mild, moderate, and severe dehydration; infantile toxicosis; constipation; omphalitis.

   Level 2. Malformation and caries of the teeth; vomiting; pyloric stenosis; bacterial and viral infections and allergies; anorexia; inguinal, umbilical, and strangulated hernias.

   Emergency care. Strangulated hernia; invagination; appendicitis; peritonitis; intoxication; alimentary, drug, indigenous, petroleum; pyloric stenosis; imperforate anus.

2. *The genitourinary system* includes:

   Level 1. Vulvovaginitis, phimosis, cystitis, urinary tract infections.

   Level 2. Cryptorchidism, hydrocele.

   Level 3. Pyelitis, nephrosis, nephritis, congenital diseases, hypospadias.

3. *The respiratory system* includes:

Level 1. Otitis media, common cold, rhinopharyngitis, croup, whooping cough, tonsillitis, bronchitis, pneumonia, asthma.

Level 2. Tuberculosis, bronchiolitis, retropharyngeal abscess, epiglottitis.

Emergency care. Laryngitis, croup, pertussis, asthma.

4. *The neurological/musculoskeletal system* includes:

Level 1. Convulsions, concussions, simple fractures, closed fractures.

Levels 2 and 3. Epilepsy, compound or open fractures, osteomyelitis, curvature of the spine, congenital foot deformities, congenital hip dysplasia, cerebral palsy, rickets, tibial torsion, rheumatoid arthritis, and other similar bone and neuromuscular disorders.

Level 3. Increased intracranial pressure, hydrocephalus, brain tumors, spinal cord injuries, myelomeningocele, osteogenesis imperfecta.

5. *The cardiovascular system* includes:

a. *Congenital heart diseases:*

Acyanotic (all Level 3 care): septal defects, patent ductus arteriosus, endocardial cushion defects, coarctation of aorta, steosis of aorta or pulmonary artery.

Cyanotic (all Level 3 care): tetralogy of Fallot, tricuspid atresia, transposition of great vessels, truncus arteriosus.

b. *Acquired cardiac conditions:*

Levels 1, 2, and 3. Rheumatic fever.

Level 3. Bacterial endocarditis, pericarditis, paroxysmal atrial tachycardia (PAT), congestive heart failure.

c. *Blood diseases:*

Level 1. Iron deficiency anemia.

Levels 1 and 2. Sickle cell anemia.

Level 2. Hypoplastic and aplastic anemia, purpuras, hemophilia.

Level 3. Leukemia and other neoplastic disorders.

6. *The endocrine system* includes:

Level 2. Diabetes, diabetes insipidus, hypopituitarism, hyperthyroidism, Cushing's disease.

Levels 2 and 3. Adrenal insufficiency.

7. *The skin* includes:

Level 1. Impetigo, furuncles and abscess, scabies, pediculosis, chiggers, filariasis, cayor worm, smallpox, chickenpox, rubeola, rubella, leprosy, urticaria, eczema, intertrigo, fungus.

Levels 2 and 3. Complications of the above.

8. *The whole body,* including:

a. *Deficiency diseases,* including:

Level 1. Nutritional and iron deficiency anemia.

Level 2. Iodine deficiency, beriberi, pellagra, rickets, kwashiorkor, marasmus.

b. *Infectious diseases,* including:

Level 1. Rubeola, rubella, whooping cough, mumps, smallpox, chickenpox, venereal diseases.

Level 2. Tetanus, rabies, tuberculosis.

Level 3. Diphtheria, meningitis, encephalitis, poliomyelitis, typhoid and paratyphoid, hepatitis, leprosy.

c. *Parasitic infections*, including:
Level 1. Malaria, trypanosomiasis, bilharziasis, amebiasis, filariasis, Ascaris, hookworm, and Trichocephalus.

9. *Emergencies*, including:

- High fever.
- Burns.
- Intoxications from foods and drugs, indigenous enemas, petroleum, insecticide.
- Foreign bodies in the digestive or respiratory tracts, ear, or nose.
- Suffocation.
- Drowning.

Learning Strategies for Diseases and Disorders

1. *Develop a plan of care for children of different ages with the same disease.*
2. *List the most common illnesses affecting childhood. Discuss simple measures of prevention.*
3. *Using road-to-health charts of 10 children, demonstrate to a group of mothers the impact of illness on the developmental growth of the child.*
4. *Write a complete case history of a child. Discuss results.*
5. *Discuss how to isolate a child with an infectious disease.*

Instructional Content for Immunization

It has been recognized for centuries that individuals who recover from certain diseases are protected from recurrences. Likewise, the moderate introduction of small quantities of fluid from pustules of smallpox into the skin of uninfected persons (variolation), at a time when neither the nature of the agent, nor its mode of transmission, nor immune responses were understood, was known to be effective in

providing protection against disease. At present, we have available several passive and active immunization agents. The majority of infectious diseases occur in childhood, and the primary health care worker has a major role in the prevention of these diseases through health education to families and through participation in immunization programs.

Diseases for which there are immunizations include:

- Cholera
- Diphtheria
- Measles
- Mumps
- Pertussis
- Plague
- Poliomyelitis
- Rabies
- Rubella
- Smallpox
- Tetanus
- Tuberculosis
- Typhoid
- Yellow fever

The following facts are important for immunizations against each disease:

- Type of agent
- Dosage
- Route of administration
- Duration of effect
- Side effects
- Methods of storage
- Length of storage

Learning Strategies for Immunizations

1. *Most infectious diseases occur in childhood. List what active immunizations are available today for those common diseases.*

2. *For the materials available for active immunization state:*
   - *Route of administration.*
   - *Type of agent and conditions for its conservation.*
   - *Duration of effect.*
   - *Age and intervals at which the immunization should take place.*
3. *State the difference between active and passive immunization, using the case of tetanus.*
4. *In a village of 500 households, plan the logistics of a vaccine requiring refrigeration.*
5. *Prepare a health education program against measles.*

10
THE HEALTH OF THE ADULT

This section, on the health of the adult, surveys the conditions and diseases which affect the various body systems. On completion of this discussion, the primary care worker will be able to assess the health of an individual, recognize and treat conditions and diseases within his/her range of competence, and refer persons with complicated problems to more specialized personnel.

The chapter is structured around various body systems. Specific related conditions and diseases are categorized within each system according to three levels. These levels classify the severity of the problem and the appropriate human and technological resources to deal with the condition or disease that they list.

Level 1 includes the conditions most commonly found in tropical and subtropical regions, ones which account for a large percentage of the primary care needs of both adults and children. On this level, the plan of care usually can be carried out by the primary care worker.

Levels 2 and 3 identify conditions and diseases which may be encountered, but for which the primary care worker generally does not have the experience or technology to diagnose or treat without specialized assistance. Problems on this level can be identified and referred for specialized care. The primary care worker then would be able to carry out prescribed treatment and assume responsibility for follow-up care.

Instructional Content for the Gastrointestinal System

Level 1. Conditions or nonspecific symptoms include: loss of appetite, epigastric pain and heartburn, nausea and vomiting, flatulence or abdominal distension, abdominal pain, diarrhea.

Diseases or specific diagnoses include: stomatitis, gastritis, constipation, enteritis, amebiasis, intestinal worms, anal fissures, external hemorrhoids.

Levels 2 and 3. Tertiary care includes: caries and pulpitis, gingivitis, salivary gland lesions, trauma of the soft tissue and bones, esophagitis, esophageal varices, burns and stenosis, gastroduodenal ulcer, hiatus hernia, diverticulum, colitis, appendicitis, salmonellosis, internal hemorrhoids and thrombosis, intoxication by indigenous enema, cirrhosis, hepatitis, cholecystitis and gallstones, liver abscess, pancreatitis, diabetes, malignant and benign tumors, hernias.

Emergency Care. Gastrointestinal hemorrhage, perforated appendix, peritonitis, strangulated hernia, ileus, rupture of spleen.

Assessment, Management, and Education Skills

a. *Assessment.* The student is taught to assess gastrointestinal conditions and diseases by taking histories, laboratory tests, and performing physical examinations.

- Histories concentrate on: digestion, food intake, habits, intolerance, elimination, and the factors that relieve or aggravate associated digestive symptoms.
- Physical examinations include:
  - Inspection of the skin for scars, lesions, and rash.
  - Inspection of the abdomen for symmetry and masses.
  - Auscultation to determine bowel sounds.
  - Percussion to identify area of dullness.
  - Palpation to determine rigidity, tenderness, liver, spleen, and kidney enlargement, growth, and hernias.
  - Examination of the rectum.
- Laboratory tests of microscopic and macroscopic stools and urine tests, i.e., to determine glycosuria and acetonuria.
- X-rays, when available.

b. *Management.* The student is taught to manage and care for the various gastrointestinal conditions and disorders by administering medication and other treatments in order to alleviate symptoms.

- Administration and follow-up of patients under antihelminthics, antiamebics and commonly used laxatives, antidiarrheics and alkaline drugs
- Observation of patients taking other drugs for the gastrointestinal system
- Special care treatments: enemas, rehydration, nasogastric intubation, lavage, drainage, surgical care to assist abdominal interventions

c. *Health education.* The student is taught to educate individuals and the family about gastrointestinal diseases, related treatments, and preventive care.

- Health education of the family in the prevention of helminthiasis, amebiasis, and hepatitis, including: sterilization of needles and syringes, proper disposal of feces, proper washing of raw foods and hands.
- Search for carriers among food-handlers.
- Identify contacts and sources of infections.

Learning Strategies for the Gastrointestinal System

1. *An analysis of adult patients' complaints in an African dispensary revealed that abdominal pain was the most common symptom. A second student in a different center showed that 2,030 out of 6,848 patients had intestinal worms; the number of patients checked for worms is not known. Do the same analysis in your area and discuss the results in class. What action is appropriate in dealing with the results of your analysis?*
2. *List all the diseases transmitted by feces. Using the previous year's registry, calculate the percentage of persons suffering from these. Discuss the impact of prevention. Detail simple applicable methods of preven-*

tion. Discuss the difficulties you might encounter in implementing these methods and ways to overcome the difficulties.

3. *Visit the home of a patient suffering from amebiasis. Analyze factors which might have contributed to the disease, such as fecal disposal, water supply, and food protection from flies.*
4. *Visit the home of a patient with hepatitis. Find out if there are more cases in the area and, if so, investigate for the source of infection.*

Instructional Content for the Respiratory System

Level 1. Conditions or nonspecific symptoms include: dyspnea, cough, thoracic pain, hemoptysis.

Diseases or specific diagnosis include: epistaxis, acute and chronic rhinitis, common cold, pharyngitis, tonsillitis and abscess, laryngitis, bronchitis, pneumonia, and initial treatment and follow-up care for tuberculosis.

Levels 2 and 3. Specialized care includes: sinusitis, asthma, pleurisy, pneumohemothorax, emphysema, atelectasis, bronchiectasis, tumors.

Emergency care. Pulmonary edema and acute bronchospasm.

Assessment, Management, and Education Skills

a. *Assessment.* The student is taught to assess respiratory conditions and diseases by taking histories, laboratory tests, and performing physical examinations.

- Histories concentrate on associated respiratory symptoms such as edema, fever, and orthopnea or with coughs, expectoration, blood-streaked sputum.
- Physical examinations include:
  - Rhinoscopy and throat examination.
  - Measurements and description of abnormal respiratory movements.
  - Auscultation: to distinguish between normal and abnormal sounds (rales and wheezes).

Percussion: to distinguish dull and hyperresonant notes.
Inspection: to identify deformities of the thorax.

- Laboratory tests of sputum, cutireaction.

b. *Management.* The student is taught to manage and care for the various respiratory-system conditions and disorders by administering medication and other treatments in order to alleviate symptoms.

- Pharmacology
  Administer and control the antitussive agents and drugs specific to Level 1 disorders.
  Observation of patients under drugs affecting the respiratory system.
- Special care treatments, when available, include:
  Nasal packing.
  Inhalation.
  Vaporization.
  Oxygen therapy.
  Bronchial aspiration.
  Postural drainage.
  Surgical care (pleural drainage and tracheotomy).

c. *Health Education.* The student is taught to educate individuals and the family about respiratory-system diseases, related treatments, and preventive care.

- Home supervision of TB patients, investigation of contacts
- BCG vaccinations
- Instructions to family and patient about personal hygiene
- Smoking education

Learning Strategies for the Respiratory System

1. *Perform a general examination of a dyspneic patient and identify accompanying symptoms. Indicate which one, or more, is related to the*

respiratory system and which one, if any, is involved in a different system.

2. *Enumerate all the structures of the respiratory system which, when diseased, can produce a cough.*
3. *Discuss why antibiotics are not indicated for a common cold.*
4. *Make a list of important questions and facts to investigate for each of the nonspecific respiratory symptoms.*
5. *Using a chart and a reference book, write a complete case history.*
6. *Prepare a 10-minute talk on tuberculosis prevention.*
7. *Write up the general nursing-care treatments for a patient with pulmonary diseases.*

Instructional Content for the Circulatory System

Level 1. Conditions or nonspecific symptoms, palpitations, headache, edema.

Diseases or specific diagnosis: sickle cell and iron deficiency anemias, trypanosomiasis, varicose veins, lymphadenitis.

Levels 2 and 3. Tertiary care includes: disturbances of cardiac rate and rhythm, pericarditis, myocarditis, endocarditis, valvular diseases, angina pectoris, myocardial infarction, congestive heart failure, congenital heart diseases, arteriosclerosis, hypertension, phlebitis, blood-clotting disorders, thrombus, embolism, aneurysm, adenopathies, lymphangiectasis, Hodgkin's disease, lymphosarcoma, mononucleosis.

Emergency care. Hemorrhage and cardiac arrest.

Assessment, Management, and Education Skills

a. *Assessment.* The student is taught to assess circulatory-system conditions and diseases by taking histories, laboratory tests, and performing physical examinations.

- History related to circulatory conditions, including: associated symptoms such as edema, tachycardia, dizziness, headache, dyspnea on effort.

Factors that alleviate or aggravate the symptoms.

Family antecedents of cardiovascular diseases.

- Physical examinations include:
  - Measurements and description of abnormal pulse rhythm and volume.
  - Blood pressure measurement. Identify mild to severe high blood pressure, as well as low blood pressure.
  - Auscultation: recognition of abnormal heart sounds.
  - Palpation of cervical lymph nodes.
- Laboratory tests include:
  - Hemoglobin, sedimentation rate, blood smear and differential.
  - Lymph nodes aspiration and analysis for trypanosomes.

b. *Management.* The student is taught to manage and care for the various circulatory-system conditions and disorders by administering medication and other treatments in order to alleviate symptoms.

- Pharmacology:
  - Administration and control of hematopoietic agents through vitamins and minerals.
  - Observation of patients under drugs affecting the circulatory system.
- Special care treatments include:
  - Mechanical arrest of blood flow.
  - Blood transfusion.
  - Oxygen therapy.
  - External cardiac massage.

c. *Health Education.* The student is taught to educate individuals and the family about circulatory-system diseases, related treatments, and preventive care.

- Instruction about special diets

- Survey and treatment of population for infected cases of trypanosomiasis
- Community involvement in preventive measures: clearing bushes along water courses or around villages
- Avoidance of streams and waterholes during the warm, dry season, and wearing of protective clothes and shoes

Learning Strategies for the Circulatory System

1. *Follow several patients with edema, identify the steps taken to arrive at the diagnosis. Enumerate the different causes of edema.*
2. *Headache is a very common complaint. Discuss various causes. How do these relate to the cardiovascular system?*
3. *Study the food-intake patterns of several anemic patients. Can the anemia be traced to inadequate diet? What other factors may be involved?*

Instructional Content for the Genitourinary System

Level 1. Conditions or nonspecific symptoms: painful, frequent, and difficult urination, urinary retention, hematuria, menstrual disorders, vaginal bleeding.

Diseases or specific diagnosis in males and females. *Males:* urethritis, balanitis, acute epididymitis and orchitis, gonorrhea, cystitis/schistosomiasis, phimosis. *Females:* moniliasis, Trichomonas vaginalis, gonorrhea, cystitis (schistosomiasis), abscess of breast, mastitis.

Levels 2 and 3. Tertiary care includes: pyelitis, nephritis, hydronephrosis, nephroptosis, urolithiasis, tumors.

In males: ulcer of penis, cryptorchidism, hydrocele, varicocele, hypertrophy of prostate, sterility.

In females: menstrual disorders such as amenorrhea, dysmenorrhea, menorrhagia, metrorrhagia; sterility, displacement of uterus (anteflexion and retroversion/flexion), prolapsus, endometritis, erosion of cervix, cervicitis, salpingitis, adnexitis, syphilis, and benign and/or malignant tumors.

Assessment, Management, and Education Skills

a. *Assessment.* The student is taught to assess genitourinary-system conditions and diseases by taking histories, laboratory tests, and performing physical examinations.

- Histories concentrate on: symptoms such as pain, edema, fever, hypertension, changes in micturition, output or appearance in the reproductive organs, discharge.
  - Recent infectious diseases, especially of the respiratory tract.
  - Family history of renal disease.
- Physical examinations include:
  - Palpation of an enlarged kidney.
  - Palpation of an overdistended bladder.
  - Transillumination and palpation of scrotal content.
  - Vaginal examination: bimanual, speculum.
- Laboratory tests include:
  - Urine—macroscopic and microscopic, three glasses test.
  - Vaginal and cervical smears.
  - Urethral.

b. *Management.* The student is taught to manage and care for the various genitourinary-system conditions and disorders by administering medication and other treatments in order to alleviate symptoms.

- Pharmacology:
  - Administration and control of specific anti-infective drugs for diseases listed.
  - Observation of patients under drugs affecting the genitourinary system, e.g., diuretics and oral contraceptives.
- Special care treatments include:
  - Catheterization: simple and in-dwelling catheters.
  - Bladder irrigation.
  - Vaginal irrigation.

Perineal care.
Surgical care.
Urinary tract and female reproductive organs.
Circumcision.

c. *Health Education.* The student is taught to educate individuals and the family about genitourinary-system diseases, related treatments, and preventive care.

- Examination of contacts in venereal diseases
- Regular examination of prostitutes
- Health and sex education of community
- Premarital and prenatal examinations

Learning Strategies for the Genitourinary System

1. *Compare the number of males and females treated for venereal diseases. Is there a discrepancy between both groups? If so, what approach could you suggest to account for this discrepancy?*
2. *Write up the functions of the kidney and indicate how an interference with each of these functions would be reflected by the organism.*
3. *Make a list of diseases which can be diagnosed by a urinalysis alone.*

Instructional Content for the Musculoskeletal System

Level 1. Conditions or nonspecific symptoms: low back pain, muscular pain, pain in the joints, swelling. Injuries: bruise, sprain, and simple fractures of the arms, lower legs, collarbone, and ribs. Infections.

Levels 2 and 3. Tertiary care includes: brain concussion, fractured skull, spinal cord injury, fractured pelvis, complicated fractures, luxations, herniation of vertebral disk, congenital or acquired deformities such as abnormal curvatures of spine and deformities of feet or hands, rickets, osteomyelitis, tuberculosis and Pott's disease, arthritis, bursitis, tendosynovitis, and tumors.

Assessment, Management, and Education Skills

a. *Assessment.* The student is taught to assess musculoskeletal-system conditions and diseases by taking histories, laboratory tests, and performing physical examinations.

- History related to musculoskeletal disorders concentrates on associated symptoms such as a fever and the circumstances of onset of symptoms.
- Physical examinations include:
  - Inspection for deformities, erythema.
  - Determination of range of motion.
  - Palpation for swelling, increased heat, pain.
- Laboratory tests include:
  - Sedimentation rate.
  - Simple X-rays.

b. *Management.* The student is taught to manage and care for the various musculoskeletal-system conditions and disorders by administering medication and other treatments in order to alleviate symptoms.

- Pharmacology:
  - Administration of antirheumatics and nonnarcotic analgesics.
  - Observation of patients under specific muscular drugs.
- Special care treatments include:
  - Bandage.
  - Splint.
  - Sling.
  - Application of cast for simple fractures.
  - Walking with cane or crutches.
  - Transfer of patients with injuries.
  - Surgical care of open reduction.
  - Care of patients under traction.

c. *Health Education.* The student is taught to educate individuals and the family about musculoskeletal-system conditions and disorders, related treatments, and preventive care.

- Instructions on how to care for cast and how to reapply sling
- Rehabilitation exercises and home care

Learning Strategies for the Musculoskeletal System

1. *Class project: study 5 to 10 patients who have suffered an accident. Describe the site of the accident, time of day, and the circumstances. Are there similarities among these accidents? Could they have been prevented? How?*
2. *Write a musculoskeletal case history of your choice. Include prevention and health education discussions.*

Instructional Content for the Epidermal System

Level 1. Conditions and nonspecific symptoms are itching and rash. Specific diseases: intertrigo, impetigo, herpes simplex, herpes zoster, furunculosis, abscess, panaris, phagedena, vitiligo, warts.

Infectious diseases with dermatologic manifestations: smallpox, chickenpox, rubella, leprosy, yaws. Parasitic diseases: scabies, pediculosis, mycosis, chigger, onchocerciasis, filaria, cayor worm.

Levels 2 and 3. Tertiary care includes: eczema, psoriasis, cyst, tumors.

Assessment, Management, and Education Skills

a. *Assessment.* The student is taught to assess epidermal-system conditions and diseases by taking histories, laboratory tests, and performing physical examinations.

- History related to skin disorders. A history of associated symptoms is very important to the diagnosis, as skin disorders are often a manifestation of an underlying and sometimes serious disease.

- Physical examinations include:
  - Inspection: type of lesions, characteristics of skin surrounding lesion, tenderness, itchiness, drainage.
  - Palpation of adjoining lymph nodes.
- Laboratory tests include:
  - Blood, skin biopsy, and urine for microfilaria.
  - Collection of crust, secretions, scales.

b. *Management.* The student is taught to manage and care for the various epidermal-system conditions and disorders by administering medication and other treatments in order to alleviate symptoms.

- Pharmacology:
  - Application of topical drugs.
- Special care treatments include:
  - Bath, soaks.
  - Wet or dry dressings.
  - Incision and drainage.
  - Debridement.

c. *Health Education.* The student is taught to educate individuals and the family about epidermal-system conditions and disorders, related treatments, and preventive care.

- Hygiene
- Report of smallpox cases
- Control of contacts
- Vaccination

Learning Strategies for the Epidermal System

1. *Skin disorders are found more often among children. Identify and compare various skin lesions. Apply the appropriate treatment, and follow the evolution of the disease.*

Instructional Content for the Endocrine and Metabolic Systems

Levels 2 and 3. Tertiary care includes: hypophysis: hypo- and hyperfunctioning syndromes.

Thyroid: hypo-, hyperthyroidism, goiter. Parathyroids: tetany. Adrenal glands: adrenal hypofunction (Addison's disease), adrenal hyperfunction (Cushing's syndrome and adrenal virilism).

Pancreas: diabetes mellitus. Genital glands: hypo- and hyperfunctioning in male and female. Sterility.

Emergency care. Hyperglycemia, hypoglycemia.

Assessment, Management, and Education Skills

a. *Assessment.* The student is taught to assess endocrine- and metabolic-system conditions and diseases by taking histories, laboratory tests, and performing physical examinations.

- Histories concentrate on present symptoms, the family history of diabetes, and, in cases of sterility, an investigation of partner.
- Physical examinations include:
  - General inspection.
  - Palpation of neck for goiter.
- Laboratory tests include:
  - Glycosuria, acetonuria, and blood glucose.

b. *Management.* The student is taught to manage and care for the various endocrine- and metabolic-system conditions and disorders by administering medication and other treatments in order to alleviate symptoms.

- Pharmacology:
  - Follow-up of patients under treatment.
- Special care treatments include:
  - Supportive therapy and prevention of complications in diabetes.
  - Surgical care in thyroidectomy.

c. *Health Education.* The student is taught to educate individuals and the family about endocrine- and metabolic-system conditions and disorders, related treatments, and preventive care.

- Instructions on special diet
- Prevention of complications in diabetes
- Use of iodized salt where goiter is endemic

Learning Strategies for the Endocrine and Metabolic Systems

1. *List the hormone(s) produced by each gland of the body and the functions of these hormones. Discuss what a deficiency could produce in each case.*
2. *Write a case history of a patient of your choice.*
3. *Compare two cases of diabetes in terms of diet, insulin therapy, the patient's response indicated by the glycemia, complications, the adaptation to the disease.*
4. *Summarize in a table the differences between an insulin reaction and ketoacidosis.*

Instructional Content for the Nervous System

Levels 2 and 3. Neuritis, Bell's palsy, Ménière's syndrome, sciatica neuritis, trigeminal neuralgia, brain tumors, brain abscess, cerebral hemorrhage, brain and spinal injury, tabes, meningitis, epilepsy, migraine, tetanus, rabies.

Assessment, Management, and Education Skills

a. *Assessment:* The student is taught to assess nervous-system conditions and diseases by taking histories, laboratory tests, and performing physical examinations.

- Histories concentrate on neurological symptoms, and the discovery of the rabid animal if rabies is suspected.
  Recent wounds in case of tetanus.
- Physical examinations include:
  Neurological examination of voluntary

movements and coordination, muscle tone, gait, Achilles tendon reflex and knee reflex, Babinski's reflex, response to stimuli, state of consciousness, and pupillary reflex.

b. *Management.* The student is taught to manage and care for the various nervous-system conditions and disorders by administering medication and other treatments in order to alleviate symptoms.

- Care of wound in animal bite and in tetanus
- Physical rehabilitation in paraplegia, hemiplegia

c. *Health Education.* The student is taught to educate individuals and the family about nervous-system conditions and disorders, related treatments, and preventive care.

- Education as to the value of immunization against tetanus, the kinds of injury liable to produce tetanus
- Asepsis in childbirth
- Education of mothers in asepsis of umbilical stump of newborns

Learning Strategies for the Nervous System

1. *Study several cases of tetanus, paying special attention to the date of injury and onset of disease. (Note that sometimes the history of an injury is absent.)*
2. *Describe the care of a patient with cerebral damage. Explain how this care can prevent complications.*

Instructional Content for the Sense of Hearing

Level 1. Cerumen in ear, foreign body, furuncle in ear canal, otitis externa and media.

Levels 2 and 3. Otomycosis, mastoiditis, Ménière's syndrome, deafness.

Assessment, Management, and Education Skills

a. *Assessment.* The student is taught to assess sense-of-hearing conditions and diseases by taking histories, laboratory tests, and performing physical examinations.

- History.
- Physical examinations include:
  - Otoscopy.
  - Hearing test.
  - Examination of adjoining structures.

b. *Management.* The student is taught to manage and care for the various sense-of-hearing conditions and disorders by administering medication and other treatments in order to alleviate symptoms.

- Pharmacology:
  - Application of topical and systemic drugs.
- Special care treatments include:
  - Ear irrigation.
  - Extraction of a foreign body in external canal.

c. *Health Education.* The student is taught to educate individuals and the family about sense-of-hearing conditions and disorders, related treatments, and preventive care.

Learning Strategies for the Sense of Hearing

1. *Why is it so important to adequately treat an acute otitis media? Give causes of otitis media and their prevention. Indicate complications.*
2. *The primary care worker can be implicated in causing otitis media. Explain how.*

Instructional Content for Ophthalmology

Level 1. Poor vision, foreign body, stye, blepharitis, conjunctivitis, trachoma.

Levels 2 and 3. Tertiary care includes: refractive errors, pterygium,

spikeratomalacia, keratitis, iritis and uveitis, cataract, glaucoma, filariasis, strabismus.

Emergency care. Foreign bodies and burns.

Assessment, Management, and Education Skills

a. *Assessment.* The student is taught to assess ophthalmologic conditions and diseases by taking histories, laboratory tests, and performing physical examinations.

- History of patient.
- Physical examinations include:
  Visual acuity.
  Inspection of eyelids, conjunctiva, cornea, and eye muscles.

b. *Management.* The student is taught to manage and care for the various ophthalmologic conditions and disorders by administering medication and other treatments in order to alleviate symptoms.

- Pharmacology:
  Application of eye medications.
- Special care treatments include:
  Eye compresses and irrigations.
  Removal of superficial foreign body.

c. *Health Education.* The student is taught to educate individuals and family about ophthalmologic conditions and disorders, related treatments, and preventive care.

- Eye hygiene.
- Proper and immediate treatment of eye infection or injury to prevent impairment of eyesight.
- Avoid sleeping outside during daytime to prevent bite of Simulium flies.
- Cover the good eye in children with crossed eyes.
- Exercises for the eye.

Learning Strategies for Ophthalmology

1. *List the eye diseases which could cause blindness. Also indicate the symptoms underlying the one(s) which indicates an impending danger.*
2. *Write a brief lecture on the ways to protect the community against Simulium fly bites.*

Instructional Content for Parasitology and Entomology

Level 1. Diseases: malaria, amebiasis, trypanosomiasis, giardiasis, trichomoniasis.

Helminthiasis, intestinal: Trichocephalus, ascarides, ankylostomiasis, oxyuriasis, strongylosis, tenia. Veins: schistosomiasis.

Tissue: Guinea worm, onchocerciasis, wuchereriasis, Loa loa.

Levels 2 and 3. Leishmaniasis, echinococcosis, Fasciola hepatica.

Assessment, Management, and Education Skills

a. *Assessment.* The student is taught to assess parasitologic conditions and diseases by taking histories, laboratory tests, and performing physical examinations.

- History.
- Physical examinations include:
  Palpation for enlarged lymph nodes, spleen, liver, skin nodules, Calabar swellings.
- Laboratory tests include:
  Blood smears to determine leucocyte count and parasites.
  Stools to identify various eggs.
  Urine to identify schistosoma eggs.
  Skin snips to identify onchocerciasis.

b. *Management.* The student is taught to manage and care for the various parasitologic conditions and disorders by administering medication and other treatments in order to alleviate symptoms.

- Pharmacology
  Administration and follow-up of specific medications in Level 1 diseases

c. *Health Education.* The student is taught to educate individuals and family about parasitologic conditions and disorders, related treatments, and preventive care.

- Proper disposal of feces
- Personal hygiene and hand-washing after defecation
- Clean drinking water and protection of public water supplies from fecal contamination
- Draining anopheline breeding places
- Wearing of shoes
- Fly and mosquito control

Learning Strategies in Parasitology and Entomology

1. *Using information from the case registry at the hospital or the health center, estimate the percentage of trypanosomiasis cases which occurred during the last year. Draw a map of the area and pinpoint the case distribution. If you find an agglomeration of cases, study the environment for water courses with hot, damp, bushy borders. Discuss your findings.*
2. *Using the case registry, calculate the percentage of schoolchildren treated for malaria during a year. Compare the cost of treatment with the cost of preventive therapy for all schoolchildren. Is the difference too great for prevention to be applied in your area?*
3. *Visit the community and check if anopheline breeding habitats could be reduced.*
4. *Check the water supply. Is it protected from fecal contaminations?*
5. *In a group project, collect the main vectors of the area. Study their characteristics under microscopic and macroscopic conditions.*
6. *In a group project, do a culture on the legs of a house fly. Discuss.*
7. *Write a short health education lecture on the disease control of one insect.*

8. *Draw the basic life cycle of malaria parasites.*
9. *Discuss the relevance of conrol measures for hookworm infection. You may include (a) wearing shoes, (b) treating infected persons, (c) boiling domestic water, (d) taking iron supplements, (e) proper disposal of human excreta.*

Instructional Content for Other Infectious Diseases

Level 1. Nonspecific clinical syndrome: fever, malaise, headache, myalgia, lymphadenopathy, rash.

Levels 2 and 3. Tertiary care includes arbovirus and arenavirus diseases: dengue, yellow fever, Lassa fever.

Rickettsial diseases: typhus (louse-borne, rat or flea typhus, tick typhus).

Bacterial diseases: brucellosis, tularemia, plague, cholera, relapsing fever.

Assessment, Management, and Education Skills

a. *Assessment.* The student is taught to assess other infectious-disease conditions by taking histories, laboratory tests, and performing physical examinations.

- History.
- Physical examinations include:
  - General inspection, skin for rash and dehydration.
  - Palpation of lymph nodes, liver, spleen.
  - Vital signs to determine tachycardia, hypotension.

b. *Management.* The student is taught to manage and care for the various infectious-disease conditions and disorders by administering medication and other treatments in order to alleviate symptoms.

- Isolation techniques
- Fluid replacement
- Cautious use of appropriate antibiotics
- Immediate report of suspected cases

c. *Health Education.* The student is taught to educate individuals and family about infectious-disease conditions and disorders, related treatments, and preventive care.

- Vaccination of people involved if indicated
- Isolation and survey of contacts
- Setting up of a sanitary area around suspected region
- Means for providing an immediate supply of clean water
- Means to eradicate rats
- Organization of mass health education campaign
- Means to dispose of dead bodies

Learning Strategies for Other Infectious Diseases

The diseases in this section are rare, therefore difficult to remember. But when they occur, they are very contagious and have a high mortality rate. A good exercise is to describe each one of them with a brief summary of the symptoms which could make you suspect the presence of one of the diseases. Write up the emergency treatment, isolation, referral, and report to the health authority in your area. Make sure that similar instructions are available to everyone working in the center.

11
HEALTH-RELATED SCIENCES

This chapter outlines the scientific knowledge needed to understand and identify the structure of the human body, its normal functions and their pathological deviation from the norm; to assess illness; and to understand therapeutic methods and elementary diagnostic aids. On completing it, the primary care worker will have a working knowledge of the principles of good health maintenance.

The discussion of health-related sciences is divided into four sections and presented in the following order: anatomy and physiology, general pathology, clinical laboratory, and pharmacology.

Each of these parts outlines instructional content and offers learning strategies to aid in teaching the student how the various systems of the human body function and what steps it is necessary to take in order to maintain the health of the body and to protect it from disease.

Anatomy and Physiology: The Human Body

The basic purpose of this section on anatomy and physiology is to provide the primary care worker with the knowledge to identify and understand the normal functions and structures of the human body.

On completion of this part, the primary care worker will be able to locate the anatomical parts of the body, describe the distinctive characteristics and functions of the body, and understand clinical course information that is related to the body's care.

The section is divided as follows: the body as a unified whole, the upright and moving body, the maintenance of the body, control of body functions, and reproduction.

Instructional Content for the Body as a Unified Whole

1. *The organization of the human body,* including:

   - Component units, such as cells, water, body fluids, tissues, organs, and systems
   - Major survival functions, including homeostasis, metabolism, relationship with the environment, and perpetuation of species
   - Architectural characteristics, including the skeletal frame, symmetry, and the four main cavities
   - The four primary tissues, i.e., epithelial, muscle, connective, and nervous

2. *The cell,* which includes:

   - Morphology and structure of the cell: its membrane, cytoplasm, and nucleus
   - Physiology of the cell, including diffusion, filtration, osmosis, phagocytosis, metabolism, catabolism, and mitosis

Learning Strategies for the Body as a Unified Whole

1. *Explain water and electrolyte balance.*
2. *Draw the different parts of a cell and label them.*

Instructional Content for the Upright and Moving Body

1. *The skeletal system,* including:

   - The bones
     - Types and functions
     - Macroscopic and microscopic structures
     - Nomenclature and gross description of bones
     - Bone formation and growth
     - Male and female skeletal differences
   - The types and role of cartilage tissue
   - The types of joints and their movements

2. *The muscular system,* including:

   - Types of muscle tissue
   - Functions of muscle tissue in general, e.g., posture, movements, and heat production
   - Gross structure of muscular system
   - The physiology of the muscle, its irritability, conductivity, elasticity, contractility, tonicity
   - Principal muscles, their names, insertions, and functions
   - Bursae and weak spots in the abdominal wall

Learning Strategies for the Upright and Moving Body

1. *What are the various roles for proper body mechanics? Utilize these with a patient suffering from related physical disorders.*
2. *Assist a patient who is suffering from muscular discomfort by positioning him/her in different ways on the bed.*
3. *Transfer a patient to a chair from the bed and vice versa. Transfer a patient from a stretcher to a bed and vice versa.*
4. *Make up a patient's bed.*
5. *What is the proper alignment for bony segments?*
6. *Assist a patient with passive and active exercises.*
7. *Describe the ranges of motion. Include abduction, adduction, extension, hyperextension, flexion, and rotation.*
8. *Walk with crutches and canes yourself and then assist another student.*

Instructional Content for the Maintenance of the Body

1. *The circulatory system,* including:

   - Functions
   - Heart
     - Location and role
     - Structure, i.e., covering, wall, cavities, valves, and blood supply

Nervous system
Cardiac cycle
Pulse

- Blood
  - Cells: their size, number, appearance, function, formation, and life span
  - Plasma: composition and role
  - Clotting
  - Groups
  - Vessels: nomenclature and types
  - Circulation, including pulmonary, systemic, and fetal
  - Dynamics of circulation, including heart rate, volume, peripheral resistance, and elasticity
  - Pressure
- Lymphatic system, including organs, vessels, nodes, fluid, and circulation

2. *The respiratory system*, including:

- General functions
- Structures and functions of the nose, pharynx, larynx, trachea, bronchi, lungs, thorax, and diaphragm
- Physiology, including inspiration and expiration, pulmonary capacity, and the exchange of gases among air, blood, and cells
- Respiratory centers and control

3. *The digestive system*, including:

- General functions
- Structure and functions of the digestive tract, including the mouth, teeth, salivary glands, pharynx, esophagus, stomach, small intestine, colon, liver, pancreas, and gall bladder
- Nutritional mechanisms such as mastication, deglutition, churning, peristalsis, secretions of digestive glands, the digestion of carbohy-

drates, proteins, fats; water vitamins and minerals, absorption, metabolism, and defecation
- Nutritional requirements

4. *The urinary system*, including:

- General functions
- Structure and functions of the kidneys, ureter, bladder, and urethra
- The physical characteristics and chemical composition of urine
- The mechanisms of urinary secretion
- The control of urinary secretion

Learning Strategies for the Maintenance of the Body

1. *Examine the mucous membrane of the tongue, throat, and teeth.*
2. *Palpate the neck, abdomen, and liver.*
3. *Perform percussion and auscultation for peristalsis.*
4. *Control quality and quantity of a patient's diet.*
5. *Describe one digestive disorder and a special diet to aid in controlling this disorder. Determine whether force fluids or a gavage solution is necessary.*
6. *Control a patient's feces by observing aspect, color, consistency, and frequency of the elimination.*
7. *What are the special techniques used in assisting persons with problems of elimination? When should each be used?*
8. *Catheterize a patient.*

Instructional Content for the Control of Body Functions

1. *The nervous system*, including:

- General functions
- The types, structure, and synapse of the neuron
- The central nervous system, including the

structures and functions of the brain, spinal cord, brain and cord coverings, and fluids

- The peripheral nervous system, including the 12 pairs of cranial nerves and their distribution and functions, the 31 pairs of spinal nerves and their origin, distribution, and functions, and the reflex arc
- The autonomic nervous system, including the structure and function of the sympathetic and parasympathetic systems

2. *The endocrine system*, including:
   - General functions
   - The structure, hormone, and function of the pituitary, pineal, thyroid, parathyroid, thymus, adrenal, pancreas, ovaries, testes, exocrine, and mixed glands

3. *The sense organs*, including:
   - The skin: sense of touch
     - Structure and functions of dermis and epidermis
     - Hair and nails
     - Sebaceous and sweat glands
     - Receptors and sensations
   - The tongue: sense of taste—structure and function of the gustatory papillae
   - The nose: sense of smell
     - Structure and function
     - Receptors in nasal mucosa
   - The eye: sense of sight
     - Structures and functions
     - Accessory apparatus such as the eyelids, lashes and brows, the lacrimal canal, muscles, nerves, and blood vessels
     - Physiology of the eye, i.e., the refraction of light rays, the accommodation of lens, the constriction of pupil, convergence and visual pathways

- The ear: sense of hearing
  - Structures and functions of the external ear, the middle ear, and the inner ear
  - Vestibule, including the membranous labyrinth, semicircular canals, and cochlear duct
  - Physiology of the ear; hearing, equilibrium

Learning Strategies for the Control of Body Functions

1. *Check the Babinski, knee, Achilles tendon, and pupillary reflexes in a patient.*
2. *Give an alcohol bath to a patient. Measure the temperature of the patient before and after the bath.*
3. *What are the various means of controlling a patient's temperature? Apply these in a real situation.*
4. *Define pathological variations in temperature.*
5. *Interpret a blood sugar analysis in relation to insulin dosage and food intake.*
6. *Care for the skin, hair, and nails of a patient by bathing him/her.*
7. *Examine another student's eye using an ophthalmoscope. Describe what you see.*
8. *Measure vision in a patient.*
9. *Observe the pupillary reflex.*
10. *Irrigate the eye of a patient.*
11. *Examine another student's ear using the otoscope.*
12. *Measure hearing in a patient.*
13. *Irrigate a patient's ear.*

Instructional Content for Reproduction

1. *The female reproductive system,* including:
   - Structures and functions of the external

genitalia, perineum, vagina, uterus, fallopian tubes, ovaries, and breasts
- Ovulation, the menstrual cycle, fertilization, and pregnancy
- Hormonal control
- Menopause

2. *The male reproductive system*, including:

- Structures and functions of the testes, scrotum, epididymus, seminal duct, spermatic cord, seminal vesicles, ejaculatory duct, prostate gland, bulbourethral glands, urethra, and penis
- Spermatogenesis
- Hormone testosterone
- Copulation

Learning Strategies for Reproduction

1. *Calculate the menstrual cycle for five different women. Identify the days on which they are most likely to conceive.*
2. *Prepare a talk on fertility management for mothers coming to a postpartum clinic.*
3. *Select one of the most prevalent venereal diseases and discuss preventive measures.*
4. *Develop a sex education program to be taught by high school teachers.*
5. *Design and produce simple visual aids for teaching about human reproduction.*

General Pathology: The Study of Disease

Health: Health is defined as a dynamic process by which the individual adapts himself to the constant changes of the environment in order to maintain his physical, psychological, and social equilibrium. Thus, the objectives are to

learn the physical, psychological, and social characteristics of a healthy individual and to determine the basic needs of the individual to maintain health.

This aspect of the general pathology section is divided into three parts, concerning characteristics and needs of the healthy individual, defense mechanisms and natural barriers, and maintenance and promotion of health.

Instructional Content

1. *Characteristics and needs of the healthy individual,* including:

   - Physical appearance
   - Cleanliness of the skin, hair, and nails
   - Weight and height
   - Body temperature
   - Functions of the sense organs
     - General functions
     - Specific functions: vision, hearing, touch, taste, smell
   - Relaxation
   - Physical activities and movements
   - Nutrition
   - Elimination: skin, lungs, feces, urine
   - Consciousness and orientation to life activities
   - Communication skills
   - Psychosocial evaluation
   - Study of the digestive, respiratory, circulatory, genitourinary, locomotor, and nervous systems.

2. *Defense mechanisms against aggression,* including:

   - Natural barriers: skeleton (cranium, thoracic cage, and pelvis), the skin, hair, and nails, and the covering membranes and bacteriostatic secretions

- Reactions to stimuli, including:
  - Reflexes such as coughing, vomiting, and blinking
  - Reticuloendothelial system
  - Inflammatory reaction (vasoconstriction and vasodilatation)
  - Compensation: hyper- or hyposecretion and hypertrophy of an organ
  - Immunity, antibodies formation
  - Pain
- Psychosocial and cultural reactions: anxiety, fear, indifference, aggressivity, passivity

3. *Maintenance and promotion of health,* including:

- Proper nutrition
- Satisfactory shelter
- Environmental hygiene
- Personal hygiene
- Moderate physical and mental activities
- Harmonious relations among members of the tribe, family, and community
- Psychosocial values
- Specific preventive measures: vaccinations, various preventive consultations

Learning Strategies

1. *Observe and describe the behavior and appearance of an individual at work.*
2. *Measure weight, height, and temperature of several patients.*
3. *Examine vision, hearing, and the reactions to pain, heat, cold, and touch.*
4. *Observe and compare the gait of two individuals of different ages.*
5. *Prepare a history of an individual. Include appetite, ingestion/digestion, eating habits, quantity and quality of fluid and food intake, and alimentary intolerance.*
6. *Check perspiration.*

7. Note characteristics of feces and urine in terms of quantity and odor in a patient.
8. Check the speech ability of an individual.
9. Examine the psychosocial characteristics of an individual to determine patterns of behavior, reactions to stress, emotional reactions, religion or ideology, profession, education, and social relations.
10. Describe the tongue, palate, teeth, and oral mucous membrane.
11. Examine a patient through neck, liver, abdomen, spleen palpation.
12. Check abdomen by percussion and note result in writing.
13. Examine a patient's rectum.
14. Perform a rhinoscopy.
15. Check rhythm, frequency, and amplitude of respiration.
16. Check the respiratory system by auscultation and percussion.
17. Measure pulse and blood pressure.
18. Check the circulatory system by auscultation for sounds and rhythm.
19. Check a patient's peripheral circulation.
20. Palpate lymph nodes in neck and spleen.
21. Inspect the genitourinary system.
22. Examine a patient's breasts. Evaluate results.
23. Examine testes and kidneys by palpation.
24. Determine the menstrual cycles in women. Compare.
25. Check locomotion in one patient.
26. Note sitting and erect postures in several individuals of different ages.
27. Note grip and lifting movements in several individuals of different ages.
28. Examine a person's reaction to oral, tactile, visual, and painful stimuli.
29. Give a neurological examination to determine voluntary movements, coordination of movements, Achilles tendon and Babinski reflexes, corneal and pupillary reflex, and abdominal reflex.

30. *Demonstrate the increase in oxygen needs during a specific action by taking the pulse, observing the respiration, and measuring the blood pressure.*
31. *Demonstrate how the cerebrospinal fluid protects the brain against a blow.*
32. *Write a brief explanation of the different defense mechanisms.*
33. *Discuss psychosocial and cultural reactions.*
34. *Observe children at a dispensary before/after an injection and when a nurse approaches. Discuss.*
35. *Visit a locality and note all the factors which aid in the maintenance of the health of its inhabitants.*
36. *Write a paper on either one of the following: how can ideology or harmonious relations serve to maintain or improve health?*
37. *Give an example of a specific prevention measure and discuss.*
38. *Discuss the many accidents which happen at home through negligence. Discuss how they could be prevented.*

Disease: Disease is defined as the temporary or permanent loss of equilibrium, the breakdown of defense mechanisms, or the collapse of the adaptation power in an individual. Thus, the objectives of this aspect of a discussion of pathology are to know the signs and symptoms of a physical, mental, or social breakdown, to be able to explain the scientific causes of these breakdowns and the various related therapeutic methods of relief.

This aspect of the general pathology section is divided into four parts: etiology of disease, study of disease, manifestations of disease, and therapeutic measures.

Instructional Content

1. *Etiology of disease,* including:
    - Influential religions, spirits, sorcery, beliefs

- Scientific understanding of disease, which includes:
  Germs and parasites
  Antigens—allergies
  Heredity and hereditary predisposition
  Congenital conditions
  Inadequate nutrition
  Idiosyncrasy
  Degeneration
  Collagen diseases
  Cancer
  Trauma
- Social factors that predispose to disease
- Biological differences of sex, age, and race

2. *Study of disease,* including:

- General review of the etiology, signs and symptoms, and incidence of disease
- Communicable diseases, including their causative agents, mode of transmission, incubation and contagious period, resistance or susceptibility, and control
- Diagnostic elements such as history-taking and clinical examination
- Acute and chronic development of disease
- Prognosis: recovery, sequelae, relapse, death
- Complications
- Epidemiological measures
- Statistics

3. *Manifestations of disease,* including:

- General manifestations such as fever, headache, chills, tachycardia, general malaise, stiffness, loss of appetite, weakness, dehydration, loss of weight, leucocytosis, increased sedimentation rate, anemia, and infant convulsions

- Local manifestations such as redness or darkness of the skin, heat, swelling, pain, and loss of function
- Psychic manifestations such as depression, passivity, loss of interest, aggressivity, agitation, dependence and rejection, guilt and shame
- Social manifestations such as delinquency, banditry, unemployability, alcoholism, drug abuse, venereal diseases, disturbance of family/tribal structures

4. *Therapeutic measures,* including:

- Chemical measures
- Physical measures: heat, cold, electricity, rays, kinestherapy
- Surgery, acupuncture, traditional medicine
- Psychotherapy, ergotherapy, and sociotherapy
- Community development

Learning Strategies

1. *Study the different beliefs about the causes of diseases in your area. Discuss their implications for the individual, the family, and society.*
2. *Demonstrate through a family history of sickle cell anemia or another disease the genetic functions of heredity.*
3. *Question 5 to 10 patients on the origin of their present sickness. Compile the results and discuss with other students.*
4. *Of the 5 to 10 diseases compiled in Question 3, which ones can be controlled through environmental health efforts?*
5. *Collect a sample of pus or urine culture. Note in writing the results of this test.*
6. *Observe an antibiotic sensitivity test. Note in writing the result of observation.*
7. *Demonstrate the antigen-antibody mechanism by the tuberculin test.*
8. *Question 10 to 20 mothers who have children who either have*

measles or have been exposed to measles. Calculate time between contact and the development of the disease.

9. *Using a patient's history and clinical examination, write up a study of two or three diseases of your choice. Match with scientific evidence.*
10. *Observe a patient's wounds for five to six days. Note in writing the characteristics and healing process of the wounds.*
11. *Make a patient's chart over a three-day period that shows temperature, pulse, sedimentation rate, white cell count, and hemoglobin. Compare results with normal values.*
12. *Write up a case history and note the local, general, and psychological manifestations of the disease in question.*
13. *Select and study one common, traditional, therapeutic measure.*
14. *Give an example of where each therapeutic measure could be applied and which result is desired from the application.*
15. *In a group, discuss or write about how community development can improve the health of the community.*

Clinical Laboratory: The Study of Diagnostic Measures

The section on the clinical laboratory may be more comprehensive than is needed for primary health care workers who will work in a dispensary. Many of the analyses discussed here are performed in hospital laboratories, and patients needing these tests will therefore be referred to the hospital by the primary health care worker. However, it is important that the primary health care worker can prepare a patient psychologically for the various laboratory examinations, can perform simple analyses, and can understand the need for more complex procedures.

Instructional Content

1. *Introduction to the laboratory,* including:

- Roles of the laboratory: maintaining health, diagnosing disease, choosing and controlling treatment
- The microscope and its use: definition, description, and maintenance of microscope; adjustments of microscope for low and high power, fresh material, oil immersion, and stained samples; measurement of microscopic objects

2. *Hematology,* including:

- Hematopoiesis: myeloid cells (erythrocytes, granular leucocytes, platelets) and lymphoid cells (lymphocytes and monocytes)
- Role of various blood cellular types; the normal count in both adults and children
- Common blood examinations: e.g., fasting blood sugar is indicated for suspected diabetes
- Blood analysis: hemoglobin, hematocrit, erythrocyte sedimentation rate, white cell count, differential, platelet count, reticulocyte count, and blood film for parasites

3. *Blood groups and rhesus type,* including:

- Theory about blood groups: antigens, antibodies, and heredity
- The ABO, rhesus, and other systems: principles, method of determination, reactives used
- Cross-matching: principle and method for determination
- Transfusion reactions and investigations of these
- Coomb's test and test for hemolytic disease of the newborn: principle and method

4. *Chemical tests on blood,* including:

- Total proteins, albumin and globulin

- Protein electrophoresis
- Bilirubin
- Cholesterol
- Glycemin
- Glucose tolerance test
- Creatinine
- Electrolytes
- Enzymes: amylase, transaminases, alkaline phosphatase

5. *Serology*, including:

- Paul-Bunnell and Widal tests
- Syphilis tests
- Rheumatoid arthritis tests

6. *Bacteriology*, including:

- Stains: Giemsa's, Gram's, acid fast
- Culture techniques
- Definitions of bacteria and virus
- Physiological characteristics: metabolism and growth
- Roles of bacteria in man
- Microorganisms: definition, habitat, morphology and physiology, epidemiology, pathology, immunity, treatment, diagnosis, and prevention
- Bacteria: cocci and bacilli
- Viruses
- Rickettsiae
- Fungi: yeasts and molds
- Protozoa
- Bacteriological procedures: asepsis-antisepsis, collection of specimens, various preparations

7. *Urinalysis*, including:

- Macroscopic examination: turbidity, color, volume, specific gravity, and pH

- Specific tests: albumin, sugar, ketones, crystals, blood, bilirubin, schistosome eggs, trichomonads, bacterial counts, and pregnancy tests

8. *Stool examination,* including:

   - Occult blood
   - Parasites: helminths, amebas, schistosome eggs

9. *Parasitology,* including a study of the protozoa

   - Amebas: Entameba coli, Entameba histolytica
   - Flagellates: Giardia lamblia, trichomonas vaginalis
   - Blood and tissue flagellates: Trypanosoma (gambiense and rhodesiense) and Leishmania donovani
   - Sporozoa: malaria
   - Helminths: ascariasis, hookworms, Strongyloides, Trichuris, taenia, Schistosoma

10. *Diagnostic skin tests,* including:

    - Serum sensitization
    - Tuberculin skin reactions

Learning Strategies

1. *Write a short paragraph on the role of the laboratory. Give supporting examples.*
2. *Identify the parts of a microscope. Practice using the microscope.*
3. *Collect a sample of venous blood.*
4. *Collect capillary blood on the tip of the finger, the earlobe, and the heel of an infant. Prepare sample and examine. Write up these procedures and the findings.*
5. *Draw the five types of leucocytes. Indicate the function and percentage of each.*

6. *Draw the types of erythrocytes. Indicate the function and percentage of each.*
7. *Do a bleeding time, using another student's ear.*
8. *Mix blood from two different persons. Observe the reactions of incompatibility.*
9. *Perform several blood groupings and cross-match them.*
10. *Write up the symptoms of blood reaction in a donee. Give the appropriate therapeutic care. Recheck donor's blood.*
11. *Collect a sample for each type of common blood-chemistry test. Observe procedures done by other technicians if available. Interpret the results of the test, study the patient's chart, and give reasons for the examination. Observe the action of insulin on the glycemic curve.*
12. *Collect a sample for a serology test. Perform the same tasks as described in Number 11.*

Pharmacology: The Study of Drugs

The purpose of this part on pharmacology is to provide the primary care worker with an essential understanding of pharmacological principles and the actions, indications, contraindications, and side effects that commonly used drugs and drug products have when administered for the prevention and control of disease and for therapy affecting the various systems of the body.

Primary health care workers should be able to distinguish among and administer most basic common drugs, know the advantages and disadvantages of each, establish certain curative and preventive treatments, and identify drug reactions and appropriate measures to counteract them. In addition, they should appreciate the implications of using traditional and pharmaceutical drugs and be able to establish criteria for drug use such as cost, availability, and length of treatment, as well as being responsive to community needs and to other members of the health team involved in drug therapy.

Instructional Content

1. *General pharmacology,* including:

   - Introduction and brief history of pharmacology
   - Study of pharmacy, pharmacognostics, toxicology, dosage, therapeutics, chemotherapy
   - Classification of drugs, i.e., chemical, generic, and trade names
   - Origin of drugs, i.e., their natural and synthetic sources and the physical and chemical characteristics of medications
   - Preparation and classification of drugs
   - The factors influencing action and dosage of drugs, such as:
     - Those related to the individual, e.g., age and sex temperament, weight, pregnancy, allergy, habituation, immunity, etc.
     - Those related to the drug itself, e.g., concentration, nature, synergistic and antagonistic action, incompatibility, and accumulation
   - Administration and absorption of drugs through skin, mucous membranes, alimentary tract, and parenteral routes
   - Dosage: therapeutic, maximum, and toxic-lethal
   - Actions of drugs in the body, including absorption, distribution, metabolism, excretion
   - Drug legislation
   - Drug measures used in pharmacies: units, metric system, apothecaries' weights
   - The prescription, glossary, and abbreviations

2. *Drugs used in the prevention and control of infection,* including:

   - Immunities, i.e., passive and active, natural and artificial
   - Immunizing agents such as vaccines, toxoids,

antitoxic and antibacterial serums, and the conservation of these agents

- Anti-infectives such as sulfonamides, antibiotics, antivirals, antimycotics, sulfone, and antitubercular drugs
- Nonoral chemicals, e.g., antiseptics, disinfectants, germicides or bactericides, and bacteriostatics
- Drugs used to control parasitic infestation, including antimalarial, antitrypanosomal, antiamebic, anthelminthics, and topical parasiticides

3. *Drugs affecting the various physical systems,* including:

- The central nervous system
  - Depressants such as general anesthetics, analgesics, sedatives, hypnotics, tranquilizers, antispasmodics, anticonvulsants, muscle relaxants, antiparkinsonism agents
  - Stimulants
- The autonomic nervous system: sympathomimetics, sympatholytics, parasympathomimetics, and parasympatholytics
- The peripheral nervous system: depressants and local anesthetics
- The circulatory system: blood substitutes, hematopoietic agents (Vitamins B_{12} and folic acid) and minerals (e.g., iron), anticoagulants, coagulants, vasodilators, cardiotonics, cardiac depressants, chemotherapy, and neoplastic agents
- The respiratory system: antitussive agents such as emollients, expectorants and sedatives, stimulants, and bronchial dilators
- The gastrointestinal system: digestants, emetics, antiemetics, alkaline drugs, adsorbents, laxatives and purgatives, antidiarrhetics, and antiseptics

- The urinary system: acidifiers, alkalinizers, antiseptics, and diuretics
- The reproductive system: endocrine and anti-infectives

4. *Metabolic drugs,* including:

   - Hormones: pituitary, thyroid, adrenal, testicular, ovarian, gonadal, and pancreatic
   - Vitamins and minerals

5. *Histamines and antihistamines*

   - Acting against different types of allergies

6. *Topical drugs,* including:

   - Protective agents
   - Emollients
   - Astringents
   - Antiseptics
   - Antipruritics
   - Anesthetics

Learning Strategies

1. *Write the history of the discovery of one medication.*
2. *Make a list of 10 to 15 drugs. Write the chemical generic and trade names and find the known equivalences; give their origin.*
3. *In a group project, make a survey of traditional remedies. Try to gather as much information as possible regarding indication and effects.*
4. *What are some of the simple security measures used to verify the physical characteristics of medications?*
5. *Give some additional factors related to the patient which modify the dosage of a drug or the means of administration.*
6. *In what ways can a drug influence pregnancy?*

7. *Practice the different methods of drug administration.*
8. *Classify the drugs available at your workplace.*
9. *List all the parts of a prescription for medication.*
10. *Make a card file for each of the categories of drugs that you have studied. Prepare one or more cards for medications commonly used in the country. The card should indicate the brand* and *official name, as well as the properties, indications, contraindications, dosage, mode of administration, and conservation of the drug. (After review by instructor and class, these cards should be updated yearly.)*
11. *Make a list of diseases which can be prevented by vaccinations.*
12. *Do a brief survey of the number of children who die of diseases that could have been prevented through vaccination.*
13. *Make a list of the vaccines used in the country. For each one on the list, give the duration of immunity, the age to be administered, conservation, and cost.*
14. *Discuss the problems involved in vaccinating in areas where there is no electricity. Try to find ways to overcome these.*
15. *Give a vaccine and skin test.*
16. *In a group project, give one or more examples of the anti-infectives and antiparasites found in the local pharmacies. Write a card for each and file in the card index.*
17. *List the side effects, the contraindications, and the surveillance needed during the administration of each category of drugs.*
18. *Write a list of parasitic diseases in the area. Give the appropriate drugs in relation to action, dosage, and contraindication. Discuss the preventive measures.*
19. *Give an example of a disorder for which each category of drug might be used.*
20. *Give an example of a condition for which each category of drug would be effective.*
21. *Describe a diet you might suggest for a patient with iron-deficiency anemia.*

22. *Compare the treatments for anemia due to parasites, iron-deficiency anemia.*
23. *In a group project, make a survey at the local pharmacy to determine what antitussive agents have the same action but bear different brand names and note their costs. Discuss the findings.*
24. *Specify why it is important to keep an accurate daily weight, intake, and output record during diuretic therapy.*
25. *Discuss which hormone is used as a contraceptive.*
26. *Write a brief summary on the effect of insulin. Include a list of the hormones involved in glucose metabolism.*
27. *Give surveillance, care, and health education to a diabetic.*
28. *List the different vitamins and minerals contained in local foods.*
29. *What are the different techniques for application of topical drugs?*

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A flexible curriculum that focuses on "a description of learning outcomes and the varied resources to which students might turn to achieve those goals." No single curriculum is optimal for all students—this paper should be a guide.